

FLOODPLAIN MANAGEMENT IN MISSOURI



Quick Guide



Missouri State Emergency Management Agency

P.O. Box 116 ■ Jefferson City, MO 65102 ■ 573-526-9129

<https://sema.dps.mo.gov/programs/floodplain>

Table of Contents

1	About This Guide	19	Levee Certification for FIRMs
2	Why Do We Regulate the Floodplain?	20	Are Building Sites Higher than the BFE?
3	Missouri Floodplain Facts	21	Activities in SFHAs that Require Local Permits and Approvals
4	What is the National Flood Insurance Program?	22	Avoid SFHAs When Possible
5	Community Responsibilities	23	Fill Can Adversely Affect Floodplain Functions
6	NFIP Recommended Planning Considerations	24	Floods Don't Always Stop at the BFE
7	Flood Insurance: Property Owner's Financial Protection	25	Freeboard: Build Higher, Reduce Damage, Save on Insurance
8	The NFIP's Community Rating System (CRS)	26	Variances From Elevation Requirements
9	Looking for FEMA Flood Map Information?	27	Fundamentals of Flood Resistant Construction
10	FIRMette: FEMA Flood Maps Online	28	Flood Provisions of the International Codes®
11	Understanding the Riverine Floodplain	29	Coordinating Floodplain Ordinances and Building Codes
12	Understanding the Regulatory Floodway	30	Some Key Floodplain Development Permit Review Steps
13	The Regulatory Floodway "No-Rise" Certification	31	Carefully Complete the Permit Application
14	Flood Insurance Rate Map (Riverine)	32	Communities Must Retain Flood Records Permanently
15	Using the Riverine Flood Profile to Determine Riverine BFEs	33	What is the Elevation Certificate and How is it Used?
16	Approximate Flood Zones	34	Completing the Elevation Certificate
17	FIRM Revisions: LOMAs and LOMR-Fs	35	Paperwork is Important for Owners
18	FIRM Revisions: CLOMRs and LOMRs		

Table of Contents (continued)

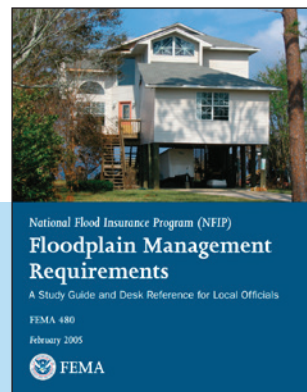
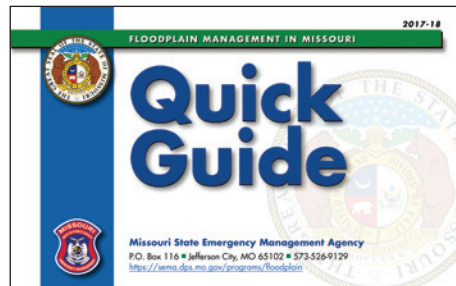
36	How to Elevate Buildings in Flood Zone A/AE	53	Substantial Improvement: Addition Plus Other Work
37	Placement and Compaction of Fill in Zone A/AE	54	Repair of Damaged Buildings
38	Basements in Flood Zones Are Unsafe	55	Substantial Damage Estimator
39	Enclosures Below the Lowest Floor (Zone A/AE)	56	Elevating an Existing Building
40	Crawlspace Details (Zone A/AE)	57	Paying for Post-Flood Compliance
41	Utility Service and Equipment Inside Enclosures	58	Non-Substantial Improvements
42	Utility Service, Equipment, and Tanks	59	Some Flood Protection for Older Homes is Easy and Low Cost
43	Pools in Flood Hazard Areas	60	Small Berms or Floodwalls May Protect Older Buildings
44	Manufactured Homes Require Special Attention	61	Some Flood Mitigation Projects are More Costly
45	Accessory Structures	62	Be Prepared for Flood Emergencies
46	Agricultural Structures	63	StormAware: Turn Around Don't Drown®
47	Recreational Vehicles and Park Trailers	64	Useful Resources and Common Acronyms
48	Substantial Improvement/Substantial Damage Desk Reference	65	Want to Learn More?
49	Improvements and Repairs of Buildings in Flood Zones		
50	What is Meant by Pre-FIRM and Post-FIRM?		
51	Substantial Improvement: Renovation Only		
52	Substantial Improvement: Lateral Addition Only		

About This Guide

This **Quick Guide** helps local officials and citizens understand why and how Missouri communities must manage development in floodplains to protect people and property. Flood-prone communities adopt codes and ordinances that detail the rules and requirements. In cases of conflict, those codes and ordinances, not the guidance provided in this publication, must be followed.

This **Quick Guide** was developed and funded jointly by the State Emergency Management Agency (SEMA) and the Federal Emergency Management Agency (FEMA).

Questions, comments and requests for additional copies should be directed to the Missouri State Emergency Management Agency at 573-526-9129.



Prepared by:

RCQUINN
CONSULTING, INC.

For more detail on all aspects of floodplain management, please refer to FEMA 480, *National Flood Insurance Program, Floodplain Management Requirements: A Study Guide and Desk Reference for Local Officials*.

Why Do We Regulate the Floodplain?

To protect people and property. Implementing floodplain management regulations reduces vulnerability to future flood risk. If we know low lying land will flood from time to time, we should make reasonable decisions to help protect our families, homes, and businesses.

To make sure NFIP flood insurance is available. Communities must join the NFIP and administer floodplain management requirements before residents and businesses can purchase NFIP flood insurance and be eligible for some types of Federal assistance, including flood mitigation grants.

To save tax dollars. Every time communities experience flood disasters local budgets are impacted. If we build smart, we'll have fewer problems the next time the water rises. Remember, Federal disaster assistance is not available for all floods. Even when the President declares a disaster, communities still must pay a portion of repair and clean-up costs, temporary housing assistance, and evacuation expenses.

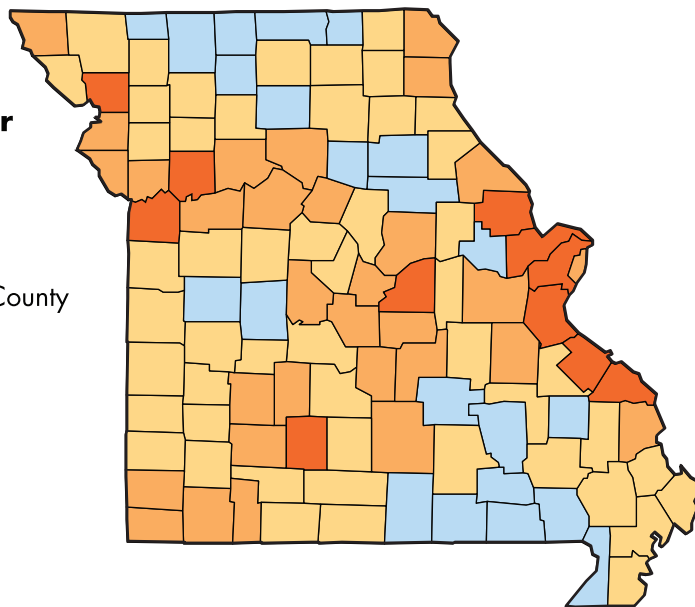
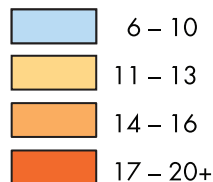
To avoid liability and lawsuits. If we know an area is mapped as a flood hazard area, and if we know people could be in danger and buildings could be damaged, doesn't it make sense to take reasonable protective steps as our communities develop and redevelop?

Since 1978, NFIP flood insurance policy holders in Missouri have received over \$797 million in claim payments. Even though that represents many payments, most of the State's flood-prone property owners do not have flood insurance.

Missouri Floodplain Facts

Presidential Flood Disaster Declarations

Number of
Declarations by County
(1965 – 2016)



- Most counties, cities, towns and villages in Missouri have identified floodprone areas shown on Flood Insurance Rate Maps.
- Thousands of buildings and other structures are located in identified floodprone areas, called Special Flood Hazard Areas (SFHAs).
- Flood maps have not been prepared for many waterways.
- Seventeen counties and 146 municipalities are floodprone but elect to not participate in the National Flood Insurance Program and do not enforce floodplain management regulations (as of October 2017).

Many flood events are not declared major disasters. Many floods are local, affecting only small areas such as several homes, a limited number of communities, or a few watersheds.

What is the National Flood Insurance Program?

The National Flood Insurance Program (NFIP) was created by Congress in 1968 to protect lives and property and to reduce the financial burden of providing disaster assistance. The NFIP is administered by the Federal Emergency Management Agency (FEMA). Nationwide, over 22,200 communities participate in the NFIP. In Missouri, more than 650 counties, cities and towns participate.

The NFIP is based on a mutual agreement between the Federal Government and communities. Communities that participate agree to regulate development in mapped flood hazard areas according to certain criteria and standards. The partnership involves:



- **Flood hazard maps.** In partnership with water management districts, communities and the State, FEMA produces flood maps in accordance with FEMA standards. The maps are used by communities, insurance agents, real estate professionals, and others.
- **Flood insurance.** Property owners and renters in participating communities are eligible to purchase NFIP flood insurance for buildings and contents.
- **Regulations.** Communities must adopt and enforce minimum floodplain management regulations so that development, including buildings, is undertaken in ways that reduce exposure to flooding.

To learn more about the NFIP, including your potential flood risk and the approximate cost of a flood insurance policy, go to FEMA's FloodSmart website www.floodsmart.gov.

Community Responsibilities

To participate in the National Flood Insurance Program, communities agree to:

- **Recognize** flood hazards in community planning ([see page 6](#))
- **Adopt and enforce** flood maps and a flood damage prevention ordinance
- **Require** permits for all types of development in the floodplain ([see page 21](#))
- **Assure** that building sites are reasonably safe from flooding
- **Establish** Base Flood Elevations (BFEs) where not determined on Flood Insurance Rate Maps (FIRMs)
- **Require** new and substantially improved homes and manufactured homes to be elevated above the BFE
- **Require** non-residential buildings to be elevated above the BFE, or dry floodproofed
- **Determine** if damaged buildings are substantially damaged
- **Conduct** field inspections; cite and remedy violations
- **Require and maintain** surveyed elevation information to document compliance ([see pages 32, 33, and 35](#))
- **Carefully consider** requests for variances
- **Resolve** non-compliance and violations of floodplain management requirements
- **Advise and work** with FEMA and the SEMA when updates to flood maps are needed
- **Maintain** records for review and respond to periodic requests for reports to FEMA

NFIP Recommended Planning Considerations

Missouri communities should consider incorporating planning considerations into comprehensive plans, land development codes, floodplain management regulations, and multi-hazard mitigation plans to reflect the long-term goal of increasing resiliency to future flooding. NFIP regulations (44 CFR Section 60.22(c)) outline 19 factors for consideration, including:

- Divert development to areas outside the SFHA to reduce flood damage
- Full public disclosure to potential buyers of properties in the SFHA
- Acknowledge that SFHA development may increase flood risk of existing development
- Improve local drainage to control increased runoff that increases the probability of flooding on other properties
- Require additional elevation above the minimum (1-foot freeboard or more above BFE)
- Require elevation methods such as pilings or columns rather than fill to maintain the storage capacity of the floodplain and to minimize environmental impacts
- Require evacuation plans for manufactured home parks and subdivisions

Flood Insurance: Property Owner's Financial Protection

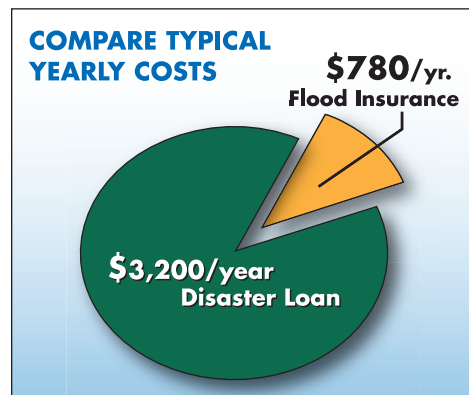
Who needs flood insurance? Flood insurance is required for all buildings in mapped flood zones shown on FEMA's maps if they are financed by Federally-backed loans or mortgages. All homeowners, business owners, and renters in communities that participate in the NFIP may purchase NFIP flood insurance on any building and its contents, even if outside of the mapped flood zone. Homes in mapped flood zones are five times more likely to be damaged by flooding than by major fires.

Not in a mapped flood zone? Unfortunately, it's often after a flood that many people discover that their home or business property insurance does NOT cover flood damage. Approximately 25% of all flood damage occurs in low risk zones, commonly described as being "outside the mapped flood zone."

Protected by a levee or dam? Even areas protected by levees or other flood control structures have some risk of flooding if the structures are overtopped or fail. Even when levees provide "100-year" flood protection, there is still a chance that a higher flood will occur.

What about disaster grants and loans? Federal disaster grants do not cover most losses and repayment of a disaster loan can cost many times more than the cost of a flood insurance policy.

Want to know more? Learn more at www.floodsmart.gov. To purchase a policy, call your insurance agent. To get the name of an agent in your community, use <Find an Agency> on the FloodSmart web page.



The NFIP's Community Rating System (CRS)

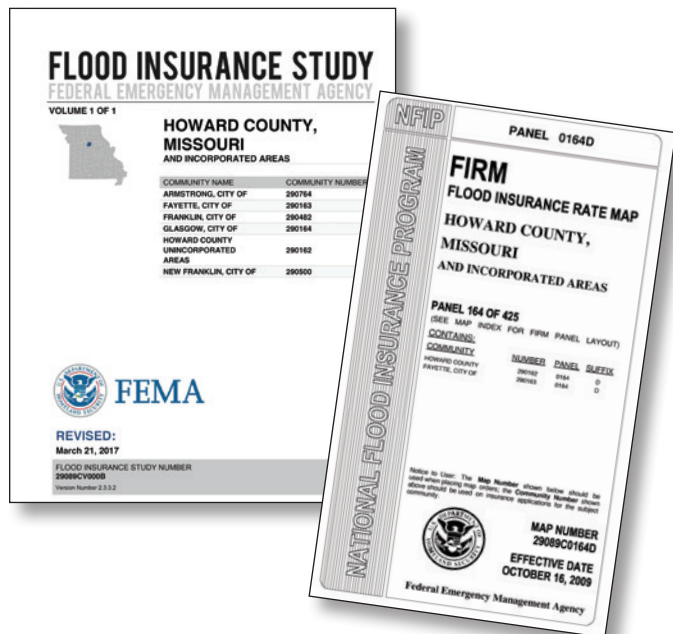
The NFIP recognizes communities that achieve better flood resiliency by providing policy holders with reduced flood insurance premiums. Communities must apply to participate in CRS and commit to implement and certify activities that contribute to reduced flood risk. Examples of actions communities can take to reduce the cost of flood insurance premiums include:

- Preserve open space in the floodplain
- Enforce higher standards for safer development through zoning, stormwater, subdivision, and flood damage protection ordinances
- Develop hazard mitigation plans and watershed and storm management plans
- Undertake engineering studies and prepare flood maps
- Obtain grants to buy out or elevate houses or to floodproof businesses
- Maintain drainage systems
- Monitor flood conditions and issue warnings
- Inform people about flood hazards, flood insurance, and how to reduce flood damage

Community officials can request assistance from CRS specialists to help with the application process and prerequisites. Check the online CRS Resource Center ([see page 64](#)).

Property owners in 9 Missouri communities that participate in the CRS receive premium discounts ranging from 5% to 25% (as of April 2017).

Looking for FEMA Flood Map Information?



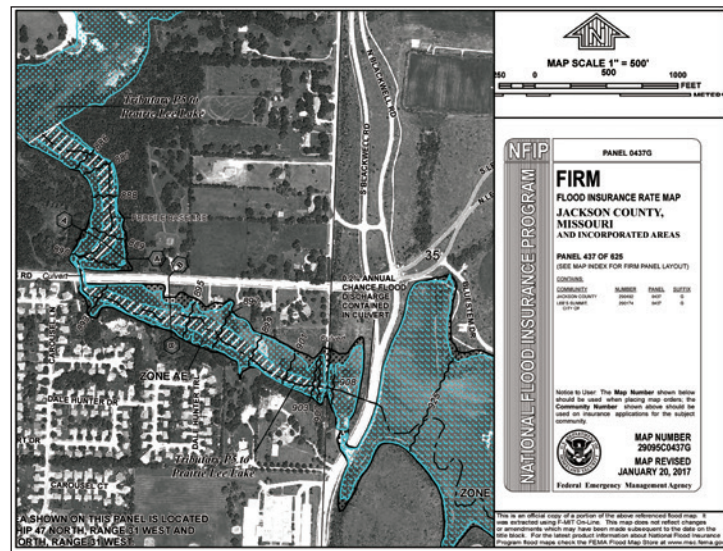
- Flood Insurance Studies (FISs) are compilations of flood risk information used for community planning and development.
- Flood Insurance Rate Maps (FIRMs) show flood zones subject to regulations and where flood insurance is required.
- Access FIRMs at the FEMA Flood Map Service Center at <https://msc.fema.gov/portal/advanceSearch>, where current and historical flood maps may be viewed and downloaded.
- Many cities and counties also make digital flood maps available online, sometimes with property parcel data.

Need a fast answer? Community planning, engineering, or permit offices and water management districts may also have paper flood maps available for viewing by the public.

FIRMette: FEMA Flood Maps Online

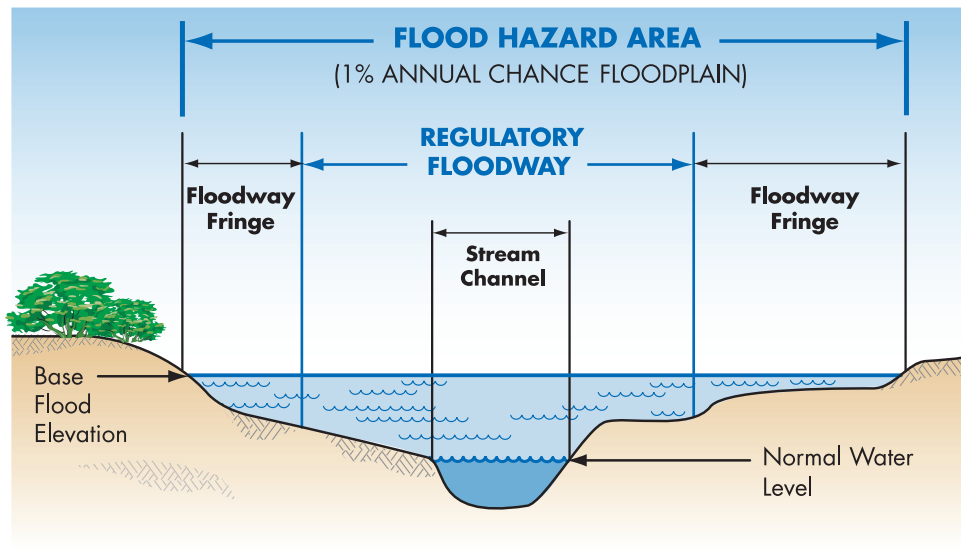
Portions of flood maps can be produced, saved, and printed by making a "FIRMette." FIRMettes are full-scale sections of FIRMs.

- The tutorial “How to Find Your FIRM and Make a FIRMette” is available at www.fema.gov/media-library/assets/documents/34930.
- Making a FIRMette is easy after a property is located. Use the <Search by Address> link or <Search ALL Products> to find the community and map panel of interest.
- Earlier versions of FIRMs are available for many communities, so current flood hazard information can be compared to historic data.



Go to <https://msc.fema.gov> and check out the “MSC Frequently Asked Questions.” For step-by-step instructions on how to read flood maps and view the How to Read a Flood Insurance Rate Map Tutorial.

Understanding the Riverine Floodplain



For riverine floodplains with Base Flood Elevations (BFEs) determined by detailed flood studies, the Flood Profile in the Flood Insurance Study shows water surface elevations for different frequency floods ([see page 15](#)).

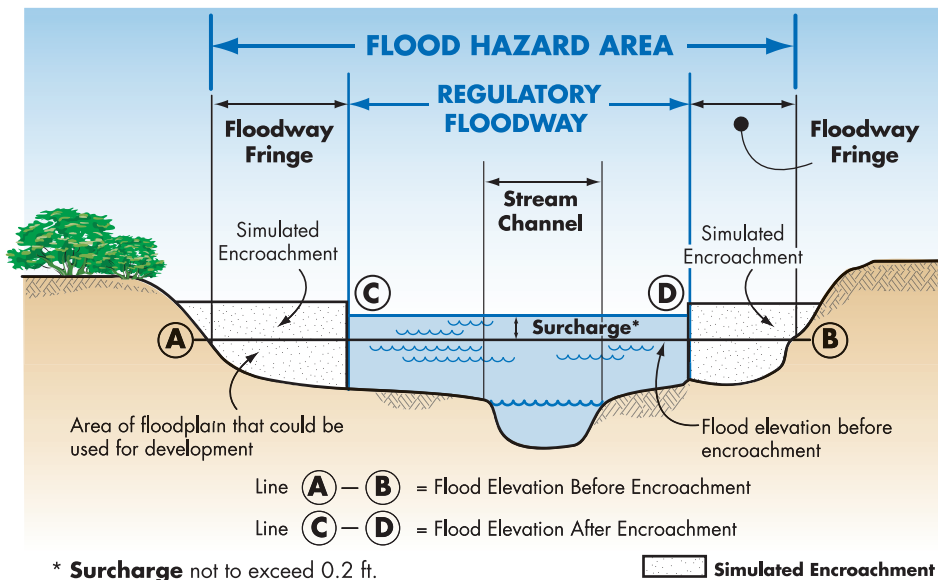


Terms and Definitions

The **Special Flood Hazard Area (SFHA)** is that portion of the floodplain subject to inundation by the base flood (1% annual chance) and/or flood-related erosion hazards. Riverine SFHAs are shown on FIRMs as Zones A, AE, AH, AO, AR, and A99. Older FIRMs may have Zones A1-A30.

[See page 12](#) to learn about the regulatory floodway, the area of the SFHA where flood waters usually are deeper and flow faster.

Understanding the Regulatory Floodway



Terms and Definitions

The **Regulatory Floodway** is the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to pass the base flood discharge without cumulatively increasing flood elevations.

Computer models are used to simulate "encroachment" or development in the floodway fringe in order to predict where and how much the Base Flood Elevation would increase if the floodway fringe is allowed to be developed.

For any proposed floodway development, the applicant must provide evidence that "no-rise" will occur or obtain a Conditional Letter of Map Revision (CLOMR) before a local floodplain permit can be issued ([see page 18](#)). Experienced registered professional engineers must make sure proposed projects either won't increase flooding or that any increases do not impact structures on other properties.

The Regulatory Floodway “No-Rise” Certification

- Floodways convey the largest volume of water and may have high velocities.
- Some communities restrict development in regulatory floodways.
- Engineers must prepare floodway encroachment analyses to evaluate the hydraulic impact of proposed development.
- Development is not allowed unless certified to cause “no-rise” (no increase) in Base Flood Elevations.
- Fencing in floodways should be “open” to allow floodwater to flow through; solid fencing (stockade, privacy) are floodway encroachments.
- “No-rise” certifications must be signed, sealed, and dated by a Professional Engineer licensed in Missouri and qualified to conduct hydraulic analyses.
- Download the “No-Rise” Certification form and instructions from SEMA’s Floodplain Forms page <https://sema.dps.mo.gov/programs/floodplain>

ENGINEERING “NO-RISE” CERTIFICATION

Community: Anytown, MO
Applicant: ABC Developers, Inc.
Address: 210 River Road

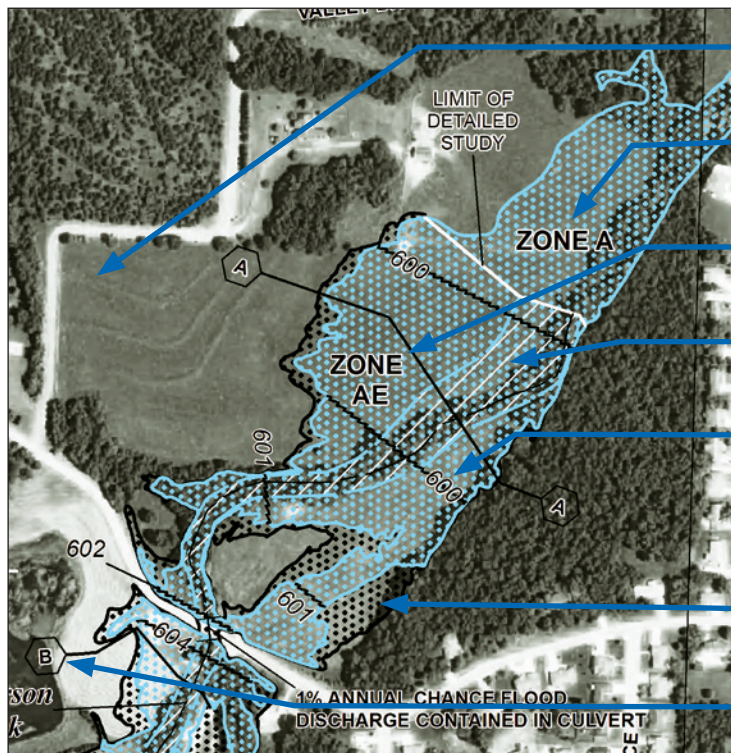
This is to certify that I am a duly qualified engineer licensed to practice in the State of Missouri. It is to further certify that the attached technical data supports the fact that the proposed development described above will not create any increase to the 1% elevations on said flooding source above at published cross sections in the Flood Insurance Study for the above community dated September 1, 2017 and will not create any increase to the 1% flood elevations at unpublished cross-sections in the vicinity of the proposed development.

Chad H. P.E. 

The floodway encroachment analysis must be based on technical data obtained from FEMA.

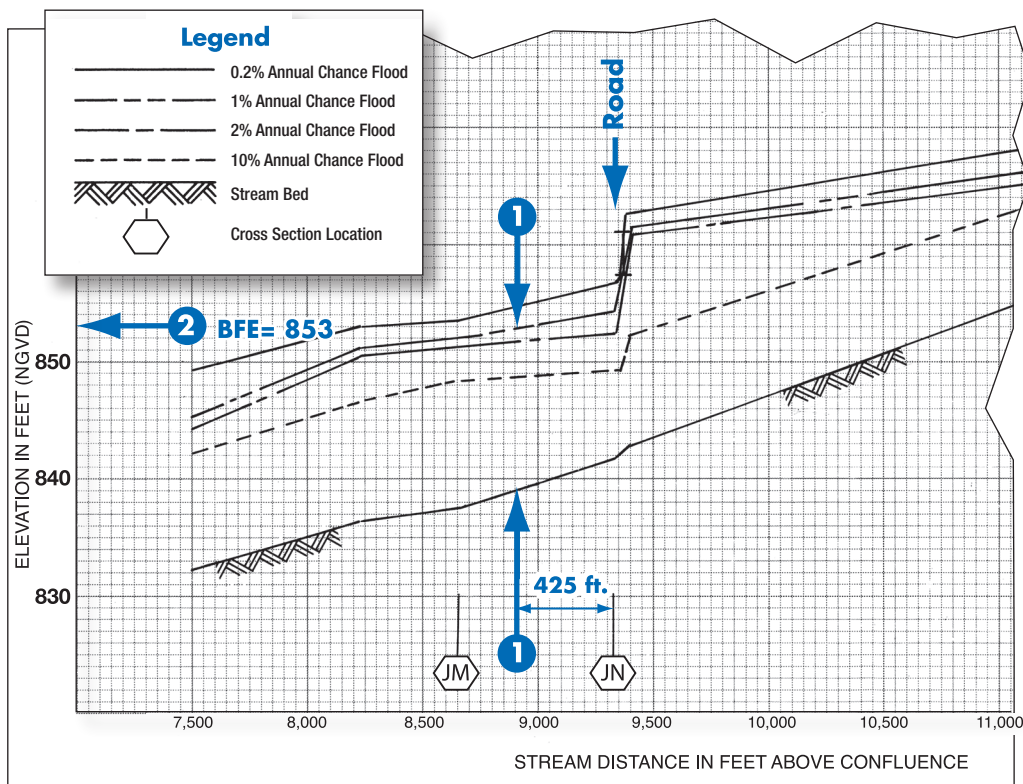
Reduce flood risk – don’t build in the Floodway!

Flood Insurance Rate Map (Riverine)



- 1 **Unshaded Zone X** is all other areas considered low risk (formerly Zone C).
- 2 **Zone A** (approximate) is the flood hazard area without BFEs.
- 3 **Zone AE** is the 1% annual chance (100-year) floodplain with BFEs (formerly Zones A1- A30).
- 4 The **Floodway** is the cross-hatched area ([see page 12](#)).
- 5 **Base Flood Elevation (BFE)** is the water surface elevation of the base flood rounded to the nearest whole foot (consult FIS profiles and tables for more accurate elevations).
- 6 **Shaded Zone X** is the 0.2% annual chance (500-year) floodplain (formerly Zone B).
- 7 **Cross Section** location ([see page 15](#)).

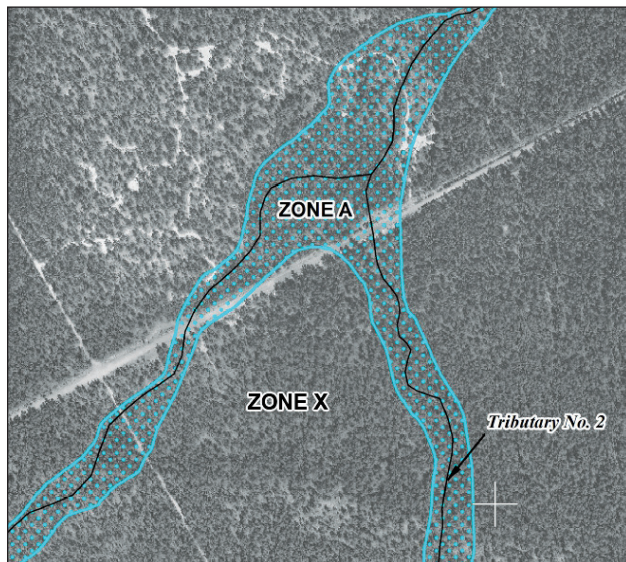
Using the Riverine Flood Profile to Determine Riverine BFEs



Flood Profiles from Flood Insurance Study reports can be used to determine the BFE at a specific site. Profiles also show estimated water surface elevations for floods other than the 1% annual chance flood (100-year).

- 1 On the effective flood map, locate the site by measuring the distance, along the profile baseline of the stream channel, from a known point such as a road or cross section, for example, **JM** or **JN**.
- 2 Scale that distance on the Flood Profile and read up to the profile of interest, then across to determine the BFE, to the nearest 1/10 of a foot. (Answer: 853 feet).

Approximate Flood Zones



FEMA uses existing information – not engineering studies – to draw Approximate Zone A boundaries. Information may be provided by the U.S. Army Corps of Engineers, other federal agencies, State and local agencies, and historic records.

For assistance determining BFEs, contact community planning, engineering or permit offices or water management districts. Useful guidance for local officials and engineers is found in FEMA 265, *Managing Floodplain Development in Approximate Zone A Areas*.

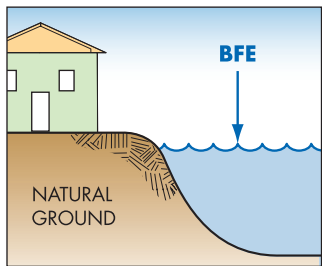
Terms and Definitions

An **Approximate Zone A** is a special flood hazard area where BFE information is not provided.

If data are not available from another source, and provided there is no evidence indicating flood depths have been or may be greater than two-feet deep, local officials may specify the BFE is two feet above the highest adjacent grade.

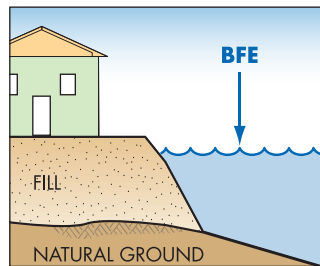
FIRM Revisions: LOMAs and LOMR-Fs

The most accurate information available is used to make flood maps, including topographic base maps and detailed engineering methods or methods of approximation. FEMA issues map revisions if technical data are submitted to support the changes.



Letter of Map Amendment (LOMA) is an official amendment to an effective FIRM that may be issued when a property owner provides additional technical information from a professional land surveyor, such as ground elevation

relative to the BFE. Lenders may waive the flood insurance requirement if the LOMA removes a building site from the SFHA because natural ground at the site is at or above the BFE.



Letter of Map Revision Based on Fill (LOMR-F) is an official revision to an effective FIRM that is issued to document FEMA's determination that a structure or parcel of land has been elevated by fill

above the BFE, and therefore is no longer in the SFHA. Lenders may waive the insurance requirement if the LOMR-F removes a building site from the SFHA.

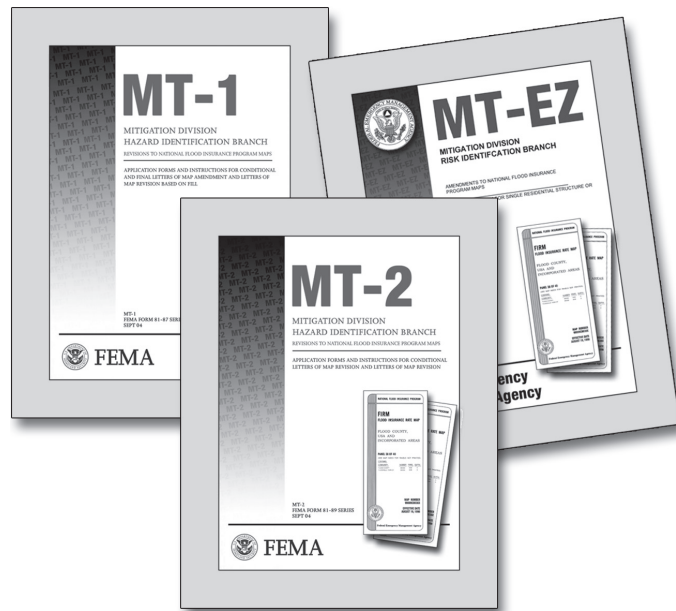
Check www.fema.gov/letter-map-amendment-letter-map-revision-based-fill-process for guidance on map revisions. Access to FEMA's web-based application for professional land surveyors to submit eLOMAs is hazards.fema.gov/femaportal/resources/whatiseloma.htm.

FIRM Revisions: CLOMRs and LOMRs

■ Conditional Letter of Map Revision (CLOMR)

comments on whether a proposed project, if built as shown on the submitted documentation, would meet the standards for a map revision. Communities should require this evidence prior to issuing permits for fill or alteration of a watercourse. Certificates of Occupancy/Compliance should be withheld until receipt of the final LOMR based on “as-built” documentation and certification.

- **Letter of Map Revision (LOMR)** is an official revision to an effective FIRM that may be issued to change flood insurance risk zones, special flood hazard areas and floodway boundary delineations, BFEs and/or other map features. Lenders may waive the insurance requirement if the approved map revision shows buildings to be outside of the SFHA.



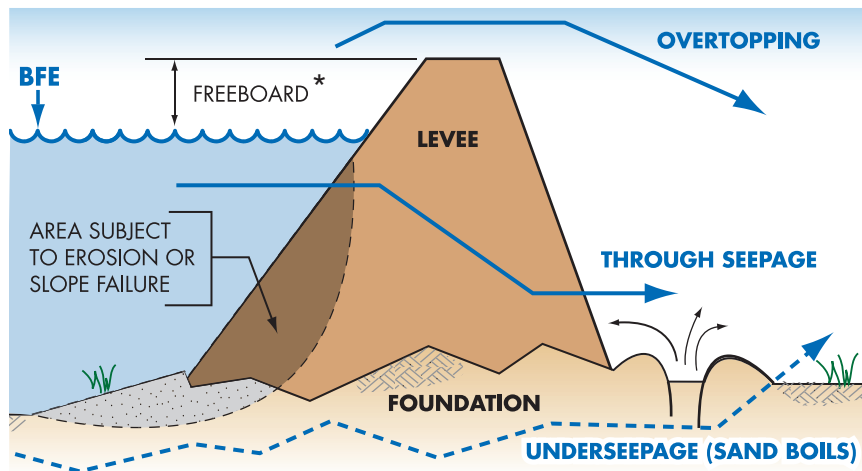
To learn more and download forms, find links by searching key words “MT-EZ,” “MT-1,” and “MT-2.”

Levee Certification for FIRMs

Many levees are designed to protect land against flooding from the Base Flood. In order for FEMA to show those areas as outside of the Special Flood Hazard Area, communities and levee owners must certify that levees meet certain design criteria. Certification will present significant challenges during the map revision process.

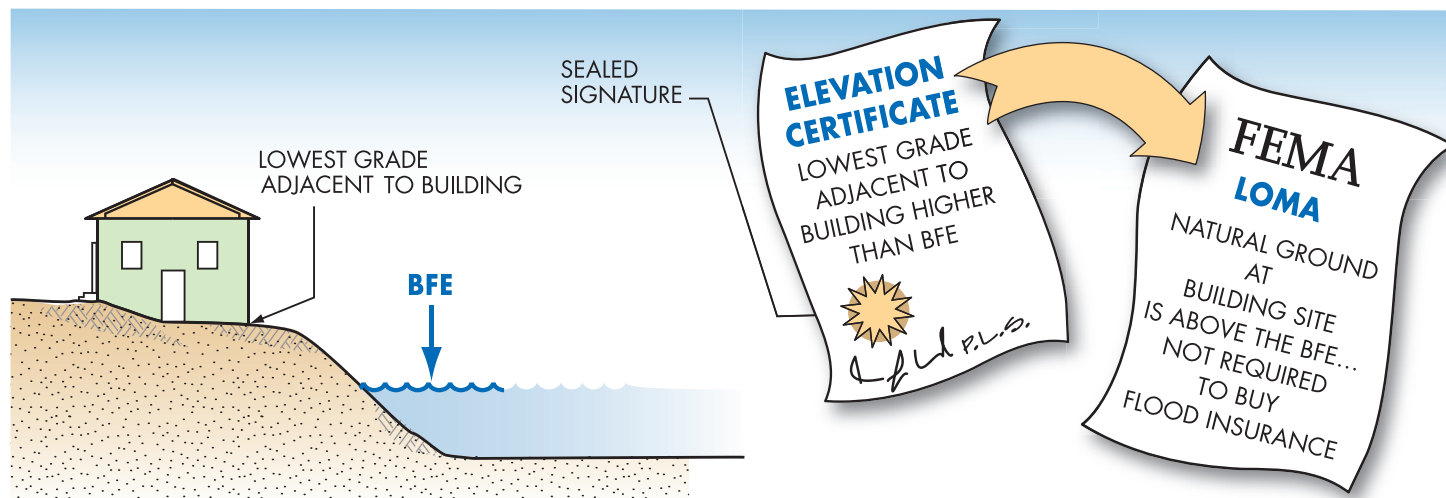
Communities that have levees should determine as soon as possible whether certification will be required. Pursuant to FEMA's Procedural Memoranda 34 and 43, and as outlined in Federal regulations at 44 CFR Section 65.10, the documentation requirements address:

- Freeboard
- Closures
- Embankment protection for erosion
- Embankment and foundation stability
- Settlement
- Interior drainage and seepage
- Operation and maintenance plans
- Other site specific criteria



* Freeboard is the distance between the BFE and the top of the levee; for FEMA accreditation freeboard is usually 3 feet

Are Building Sites Higher than the BFE?



If land is shown on the map as “in” the SFHA, but the building site is higher than the Base Flood Elevation (BFE)... get a professional land surveyor to complete a FEMA Elevation Certificate (EC). Submit a request for a Letter of Map Amendment to FEMA along with the EC to verify that the structure is above the BFE ([see page 17](#)). If FEMA approves the request, lenders are not required to have property owners get flood insurance policies, although some may still require them. Owners should keep certificates and LOMAs with deeds— the documentation will help future buyers.

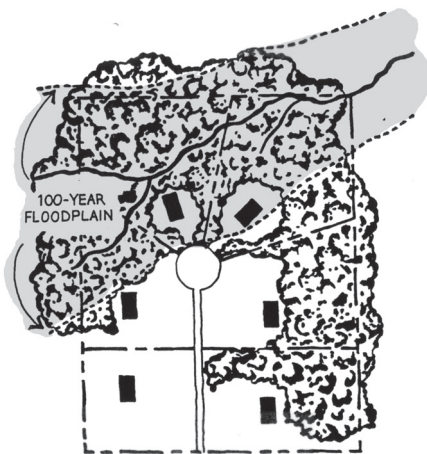
Activities in SFHAs that Require Local Permits and Approvals

- Construction of new buildings
- Additions to buildings
- Substantial improvements to buildings
- Renovation of building interiors
- Repair of substantially damaged buildings
- Placement of manufactured (mobile) homes
- Subdivision of land
- Construction or placement of temporary buildings and accessory structures
- Construction of agricultural buildings
- Construction of roads, bridges, and culverts
- Placement of fill, grading, excavation, mining, and dredging
- Alteration of stream channels



Floodplain development or building permits must be obtained before these and **ANY** land-disturbing activities occur in flood zones.

Avoid SFHAs When Possible

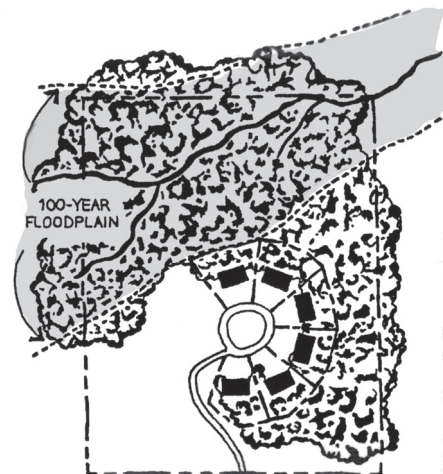
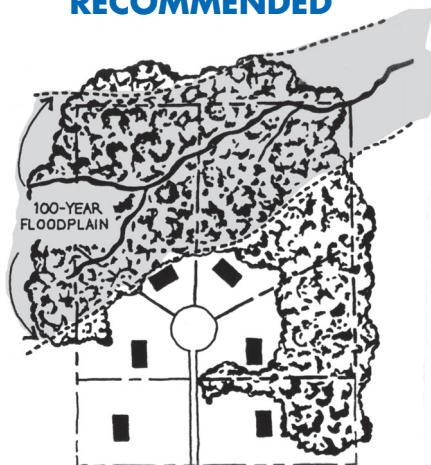


All land subdivided into lots, some homesites and lots partially or entirely in the floodplain.

NOT RECOMMENDED

All land subdivided into lots, some lots partially in the floodplain, setbacks modified to keep homesites on high ground.

RECOMMENDED



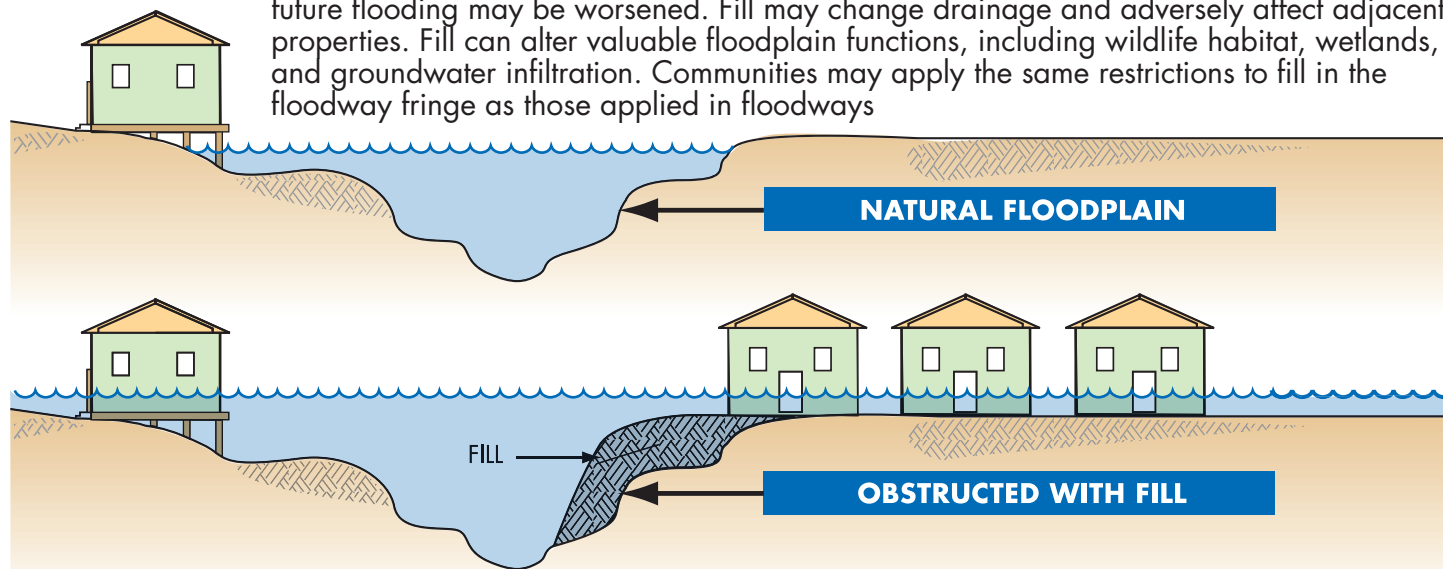
Floodplain land put into public/common open space, net density remains, lot sizes reduced and setbacks modified to keep homesites on high ground.

RECOMMENDED

Let the floodplain perform its natural function – if possible, keep it as open space. Other compatible uses: Recreational areas, playgrounds, reforestation, unpaved parking, gardens, pasture, and created wetlands.

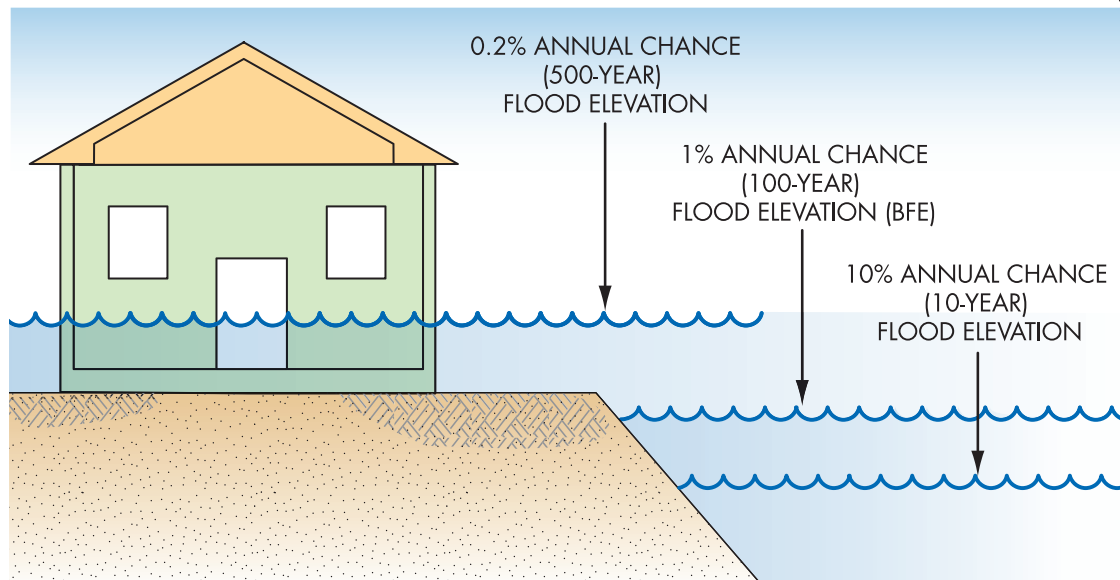
Fill Can Adversely Affect Floodplain Functions

Floodplains are supposed to store floodwater. If storage space is blocked by fill material, future flooding may be worsened. Fill may change drainage and adversely affect adjacent properties. Fill can alter valuable floodplain functions, including wildlife habitat, wetlands, and groundwater infiltration. Communities may apply the same restrictions to fill in the floodway fringe as those applied in floodways



Communities should make sure fill in flood zones won't harm neighboring properties. Before deciding to use fill, property owners should check with local planning, engineering, or permit offices. Engineering analyses may be required to demonstrate that fill will cause "no-rise" ([see page 13](#)).

Floods Don't Always Stop at the BFE



Important

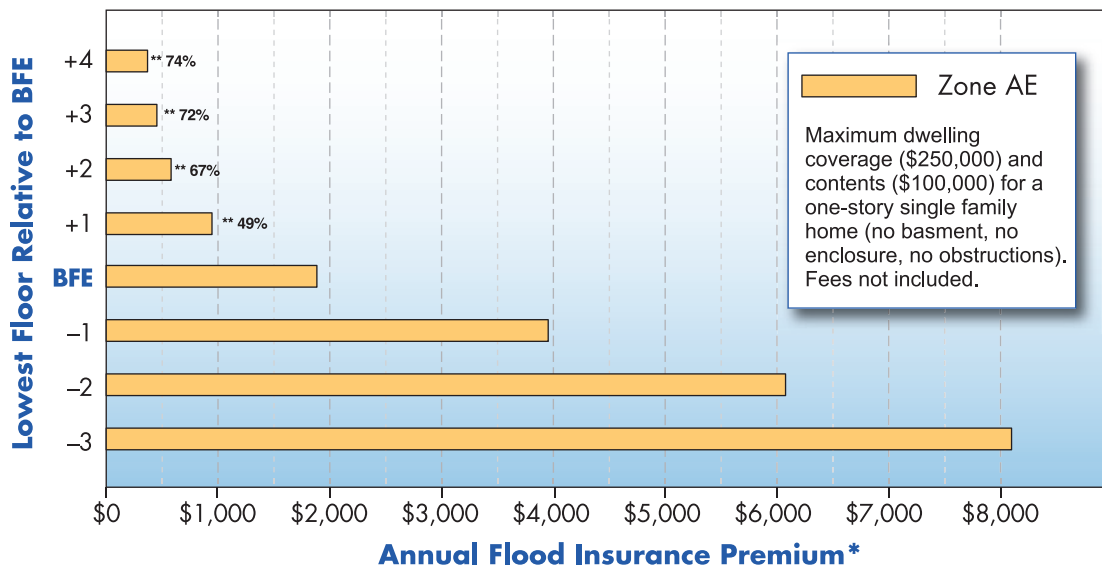
Information

Many people don't understand just how risky building in flood zones can be. There is a greater than 26% chance that a non-elevated home in the SFHA will be flooded during a 30-year mortgage period. The chance that a major fire will occur during the same period is less than 5%!

CAUTION! Major storms and flash floods can cause flooding that rises higher than the Base Flood Elevation (BFE). Be safer – protect your home or business by avoiding flood zones or building higher. [See page 25](#) to see how this will save you money on flood insurance.

Freeboard: Build Higher, Reduce Damage, Save on Insurance

Freeboard is additional height – a factor of safety – above the BFE. Buildings that are higher than the BFE experience less damage. Owners of buildings elevated above the BFE also save on NFIP flood insurance.



* Unofficial estimates using 2017 rates; use only for comparison purposes

** Savings over at-BFE premium



Important

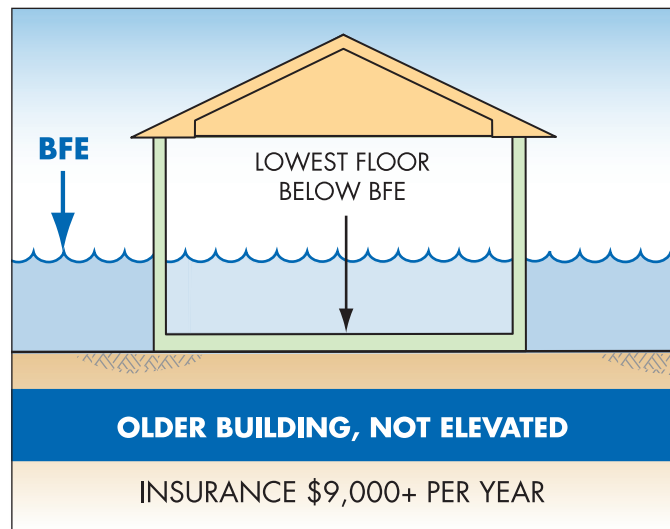
Information

NOTE! Flood insurance rates and various fees change from time to time. Rather than specific costs for insurance, these figures give a feel for how much difference just a foot or two can make.

Remember! Builders must submit floor elevations as part of foundation inspections. An error of just 6 or 12 inches could more than double the cost of NFIP flood insurance.

A community may be able to grant a variance, but the owner will probably be required to buy insurance. Imagine trying to sell a house if the bank requires insurance that costs more than \$8,000 a year!

Variances From Elevation Requirements



Very specific conditions related to the property (not the owner's actions or preferences) must be satisfied to justify a variance:

- Good and sufficient cause
- Unique site conditions
- Non-economic hardship
- If in the floodway, no increase in flood level

A variance that allows construction below the BFE does not waive the lender's flood insurance requirement. Flood insurance will be very expensive – perhaps more than \$8,000 per year ([see page 25](#))!

Property owners and communities must carefully consider the impacts of variances to allow buildings below the BFE. Not only will buildings be more likely to sustain flood damage, but NFIP flood insurance will be very costly. Communities with a pattern of granting variances may be subject to NFIP sanctions, costing all insurance policyholders even more.

Fundamentals of Flood Resistant Construction

Two objectives of the NFIP are to reduce flood damage and guide development to less hazard prone areas. When buildings are built in special flood hazard areas, increased resistance to flooding is achieved by the following fundamentals:

- **Foundations** capable of resisting flood loads (including dry floodproofed nonresidential buildings)
- **Structurally sound walls and roofs** capable of minimizing penetration by wind, rain, and debris
- **Lowest floors elevated** high enough to prevent floodwaters from entering during the design event
- **Equipment and utilities** elevated or designed to remain intact and be restored easily
- **Enclosures below elevated floors** limited to parking, limited storage, and building access and are designed to minimize damage
- **Flood damage-resistant materials** used below elevated lowest floors



Important Information

The International Codes® establish minimum requirements to provide a reasonable level of safety, public health and welfare through the application of various standards to achieve safety for life and property from fire and other hazards, including flood hazards.

In short ... flood resistant buildings!

Flood Provisions of the International Codes®

The International Codes (I-Codes) include flood provisions that meet or exceed the NFIP requirements for buildings and structures. More than 100 Missouri communities adopt and enforce one or more of the I-Codes.

- **International Building Code:** Flood provisions are primarily in Section 1612 Flood Loads, which refers to the standard *Flood Resistant Design and Construction* (ASCE 24).
- **International Residential Code:** Flood provisions are primarily in Section R322 Flood-Resistant Construction, although there are requirements in several other sections.
- **International Existing Building Code:** Flood provisions are found in sections on repairs, alterations, additions, and historic structures and in sections on prescriptive and performance compliance methods.
- **International Plumbing, Mechanical, Fuel Gas Codes:** Flood provisions are in a number of sections.



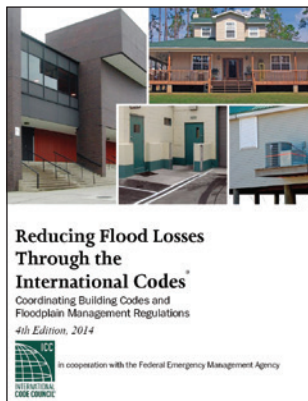
Excerpts of the flood provisions of the I-Codes, “Highlights of ASCE 24,” and other resource materials are available online www.fema.gov/building-code-resources.

Coordinating Floodplain Ordinances and Building Codes

FEMA encourages communities to consider floodplain management ordinances that are explicitly written to work with building codes, relying on the codes for building requirements and the companion ordinance for administrative provisions and requirements for non-building development. This avoids complications that can arise when communities have both ordinances and building codes.

Communities with both floodplain management ordinances and building codes should compare the requirements and consider:

- Are wording differences meaningful?
- Do the “more restrictive” provisions always prevail? If yes, who decides?
- What’s the burden on the regulated public, design professionals, buildings and on every community to figure it out?
- Is there liability for failure to enforce the more restrictive provisions?



Important Information

Reducing Flood Losses Through the International Codes describes the differences between the NFIP requirements and the flood provisions in the I-Codes, poses several questions to guide decisions, and offers sample language for higher standards to strengthen the I-Codes. Contact the Missouri Floodplain Management section for assistance.

<https://www.fema.gov/media-library/assets/documents/96634>

Some Key Floodplain Development Permit Review Steps

The permit reviewer must check many things. Some of the key questions are:

- Is the site near a watercourse?
- Is the site in the mapped flood zone or floodway?
- Are applicants advised that other State or Federal permits must be obtained before work starts?
- Is the site reasonably safe from flooding?
- Does the site plan show the flood zone, Base Flood Elevation and building location?
- Is substantial improvement or repair of substantial damage proposed?
- Is an addition proposed?
- Will new buildings and utilities be elevated properly?
- Will manufactured homes be properly elevated and anchored?
- Do the plans show an appropriate and safe foundation?
- Are all required design certifications submitted?
- Will the owner/builder have to submit an as-built Elevation Certificate?



Carefully Complete the Permit Application

Part of Floodplain Development Permit Application (only key parts shown)

Application No.: 01094 Date: March 24, 2017
David & Sally Jones 03-24-17
 Owner or Agent Date Builder APC Builders, Inc.

SITE DATA

1. Street Address: _____
2. Type of Development: Filling ☒ Grading ☒ Excavation ☐ Minimum Improvement ☐
 Routine Maintenance ☐ Substantial Improvement ☐ New Construction ☐ Other ☐
5. Value of Improvement (fair market): \$ N/A Pre-Improvement/Assessed Value of Structure: \$ _____
6. Is the Property Located in a Designated FLOODWAY? Yes ☐ No ☒
7. In designated Floodplain FRINGE or SFHA without Designated FLOODWAY? Yes ☒ No ☐
8. Elevation of the 1% Base Flood Elevation (ID source) 759 (FIS)
9. Elevation of the Proposed Development Site 757.5
12. Other Permits Required? Corps of Engineers 404 Permit: Yes ☐ No ☒ Provided ☐
 State Dept of Natural Resources: Yes ☐ No ☒ Provided ☐

PERMIT APPROVAL / DENIAL

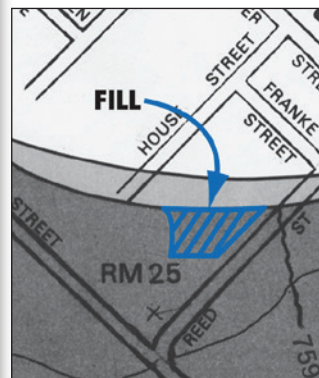
Plans and Specifications Approved Denied this 25th Day of June, 20 17
David M. Jones Robert Penoyer
 Signature of Property Owner or Agent Authorizing Official



Important

Information

You must get all permits **before** you work in a flood zone.



Good information will lead to better construction and less exposure to future flood damage.
 Contact the local floodplain administrator or building, planning or engineering department for application forms and guidance.

Communities Must Retain Flood Records Permanently

Communities that participate in the NFIP agree to maintain certain documentation for all development in flood zones, including:

- Permits issued and variances granted
- Floodway encroachment (no-rise) and watercourse alteration
- Design certifications for dry floodproofed nonresidential buildings
- Design certification for engineered flood openings
- Determinations of whether work on existing buildings is substantial improvement or repair of substantial damage
- Surveyed “as-built” building elevations (Elevation Certificates)



Important

Information

Missouri's General Records Retention Schedule, published by the Secretary of State, requires retention of records related to “requests and authorizations for property owners to erect new structures, including signs, or make structural modifications to existing ones... for the life of structures.

What is the Elevation Certificate and How is it Used?

- The Elevation Certificate (EC) is a FEMA form. Go to www.fema.gov and search for "Elevation Certificate."
- The EC must be completed and sealed by a professional land surveyor licensed in Missouri.
- Community officials may complete the EC for sites in Approximate Zone A and Zone AO (see Section G of the EC).
- It can be used to show that lowest grades adjacent to planned or existing building sites are above the Base Flood Elevation ([see page 25](#)).
- It is used to verify building and equipment elevations.
- Insurance agents use the EC to write and rate flood insurance policies.
- [See page 65](#) for online Elevation Certificate training information.

By itself, the EC cannot be used to waive the requirement to obtain flood insurance. [See page 17](#) to learn about FEMA's Letter of Map Amendment process.

The image shows a FEMA Elevation Certificate form, Form 080-033 (7/15), titled "NATIONAL FLOOD INSURANCE PROGRAM". The form is for "PROPERTY INFORMATION" and "FLOOD INSURANCE RATE MAP (FIRM) INFORMATION". It includes sections for building details, flood openings, and flood insurance information. The form is dated November 30, 2014, and is a replacement of previous editions.

SECTION A - PROPERTY INFORMATION

A1. Building Owner's Name _____ Policy Number _____

A2. Building Street Address (including Apt., Unit, Suite, and/or Bldg. No.) or P.O. Route and Box No. _____ Company NAC Number _____

City _____ State _____ ZIP Code _____

A3. Property Description (Lot and Block Numbers, Tax Parcel Number, Legal Description, etc.) _____

A4. Building Use (e.g., Residential, Non-Residential, Addition, Accessory, etc.) _____

A5. Latitude/Longitude: Lat. _____ Long. _____ Horizontal Datum: ☐ NAD 1983 ☐ NAD 1983

A6. Attach at least 2 photographs of the building if the Certificate is being used to obtain flood insurance.

A7. Building Diagram Number _____

A8. For a building with a crawlspace or enclosure(s):

a) Square footage of crawlspace or enclosure(s) _____ sq. ft.

b) Number of permanent flood openings in the crawlspace or enclosure(s) within 1.0 foot above adjacent grade _____

c) Total net area of flood openings in A8-b _____ sq. ft.

d) Engineered flood openings? ☐ Yes ☐ No

A9. For a building with an attached garage:

a) Square footage of attached garage _____ sq. ft.

b) Number of permanent flood openings in the attached garage within 1.0 foot above adjacent grade _____

c) Total net area of flood openings in A9-b _____ sq. ft.

d) Engineered flood openings? ☐ Yes ☐ No

SECTION B - FLOOD INSURANCE RATE MAP (FIRM) INFORMATION

B1. NFIP Community Name & Community Number _____ B2. County Name _____ B3. State _____

B4. Map/Panel Number _____ B5. Suffix _____ B6. FIRM Index Date _____ B7. FIRM Panel Effective/Revised Date _____ B8. Flood Zone(s) _____ B9. Base Flood Elevation(s) (Zone A-C, use Base Flood Depth) _____

B10. Indicate the source of the Base Flood Elevation (BFE) data or base flood depth entered in Item B9:
☐ FIRM ☐ FIRM ☐ Community Determined ☐ Other/Source: _____

B11. Indicate elevation datum used for BFE in Item B9: ☐ NAVD 1983 ☐ NAVD 1983 ☐ Other/Source: _____

B12. Is the building located in a Coastal Barrier Resources System (CBRS) area or Otherwise Protected Area (OPA)? ☐ Yes ☐ No
Designation Date: ☐ CBRS ☐ OPA

FEMA Form 080-033 (7/15) Replaces all previous editions. Form Page 1 of 6

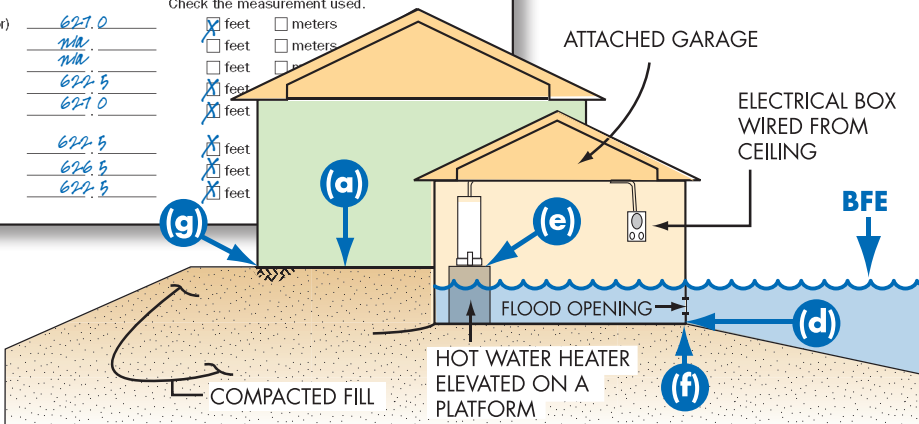
Completing the Elevation Certificate

SECTION C – BUILDING ELEVATION INFORMATION (SURVEY REQUIRED)	
C1. Building elevations are based on:	<input type="checkbox"/> Construction Drawings* <input type="checkbox"/> Building Under Construction* <input checked="" type="checkbox"/> Finished Construction <small>*A new Elevation Certificate will be required when construction of the building is complete.</small>
C2. Elevations – Zones A1–A30, AE, AH, A (with BFE), VE, V1–V30, V (with BFE), AR, AR/A, AR/AE, AR/A1–A30, AR/AH, AR/AO. Complete Items C2.a–h below according to the building diagram specified in Item A7. In Puerto Rico only, enter meters.	
Benchmark Utilized:	Vertical Datum:
Indicate elevation datum used for the elevations in items a) through h) below. <input type="checkbox"/> NGVD 1929 <input checked="" type="checkbox"/> NAVD 1988 <input type="checkbox"/> Other /Source:	
Datum used for building elevations must be the same as that used for the BFE.	
Check the measurement used.	
a) Top of bottom floor (including basement, crawlspace, or enclosure floor)	<u>625.0</u>
b) Top of the next higher floor	<u>NA</u>
c) Bottom of the lowest horizontal structural member (V Zones only)	<u>NA</u>
d) Attached garage (top of slab)	<u>622.5</u>
e) Lowest elevation of machinery or equipment servicing the building (Describe type of equipment and location in Comments)	<u>625.0</u>
f) Lowest adjacent (finished) grade next to building (LAG)	<u>622.5</u>
g) Highest adjacent (finished) grade next to building (HAG)	<u>626.5</u>
h) Lowest adjacent grade at lowest elevation of deck or stairs, including structural support	<u>622.5</u>

ELEVATION CERTIFICATE (partial)

In this example, the BFE is 625.0 feet.

The slab-on-grade house was elevated on fill 2 feet above the BFE; the garage is 2.5 feet below the BFE (with flood openings).



A professional land surveyor must fill out and seal the EC form (except in zones without BFEs). The EC includes diagrams for different building types. Several points must be surveyed. Although an EC is required only for finished construction (“as-built”), it’s a good practice to complete the EC when the lowest floor is set and prior to further vertical construction.

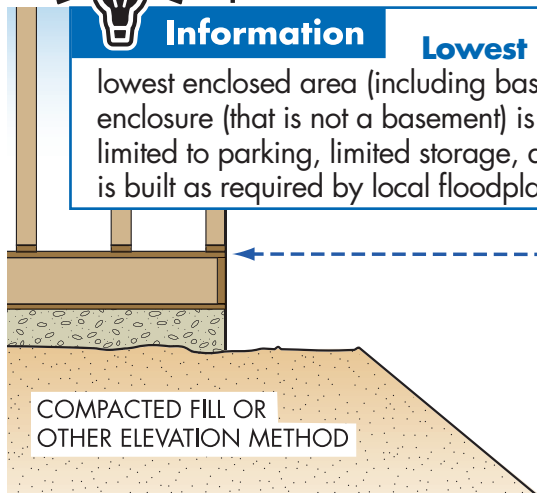
Paperwork is Important for Owners



Important

Information

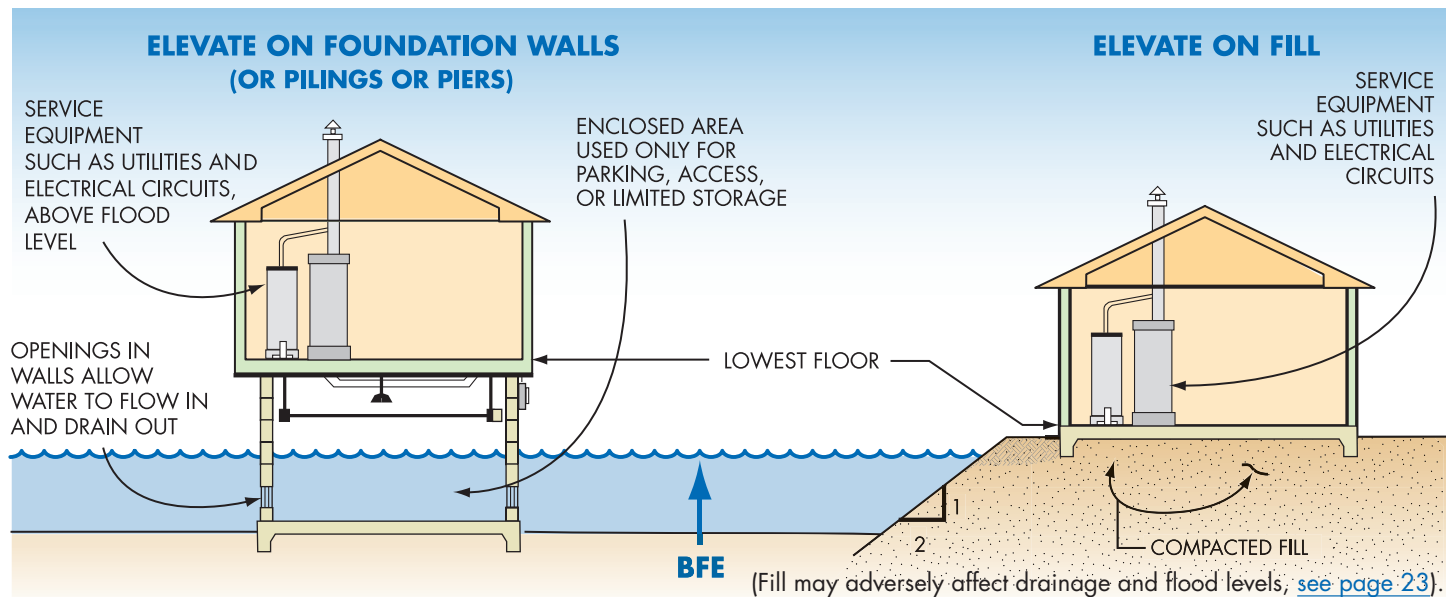
Lowest Floor means the lowest floor of the lowest enclosed area (including basement). An unfinished or flood-resistant enclosure (that is not a basement) is not the lowest floor if the enclosure is limited to parking, limited storage, and building access ([see page 39](#)) and it is built as required by local floodplain management ordinances.



Owners should keep Elevation Certificates in a safe place. They can be used to demonstrate that buildings were compliant at the time of construction. Also, Elevation Certificates are required to obtain NFIP flood insurance policies.

“As-built” Elevation Certificates should be submitted before the final inspection. Surveyors collect information helpful to verify compliance, including flood openings and elevation of equipment ([see page 34](#)).

How to Elevate Buildings in Flood Zone A/AE



CAUTION! Enclosures (including crawlspaces) have some specific requirements ([see pages 39 and 40](#)).

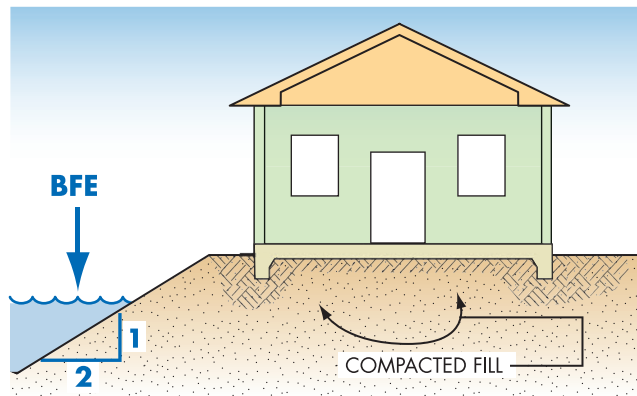
Note: When the walking surface of the lowest floor is at the BFE, under-floor utilities are not allowed.

Fill used to elevate buildings must be placed properly ([see pages 23 and 37](#)).

Placement and Compaction of Fill in Zone A/AE

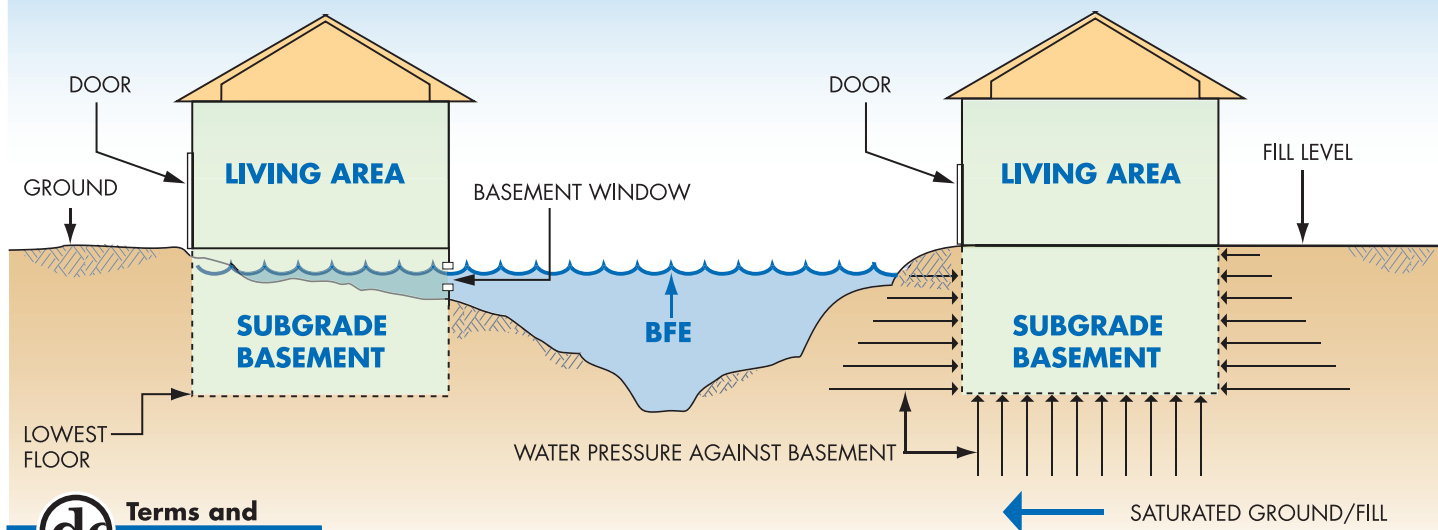
Earthen fill used to raise the ground above the flood elevation must be placed properly so that it does not erode or slump when water rises. For safety and to meet requirements, fill should:

- Not be placed in areas with poor drainage or where the fill may divert water onto adjacent properties. Instead, use perimeter walls, piers, columns, or pilings to minimize drainage problems.
- Be good clean soil, free of large rocks, construction debris, and woody material (stumps, roots)
- Be machine-compacted to 95 percent of the maximum density (determined by a design professional)
- Have graded side slopes that are not steeper than 2:1 (one foot vertical rise for every 2 feet horizontal extent); 3:1 flatter slopes are recommended
- Have slopes protected against erosion (vegetation for “low” velocities, durable materials for “high” velocities – determined by a design professional)
- Avoid the floodway ([see page 12](#))



Engineers can find more information in FEMA's instructions for Letters of Map Revision based on Fill (FEMA Form MT-1) and NFIP Technical Bulletin #10.

Basements in Flood Zones Are Unsafe



Terms and Definitions

A **basement** is any portion of a building that has its floor sub-grade (below ground level) on all sides.

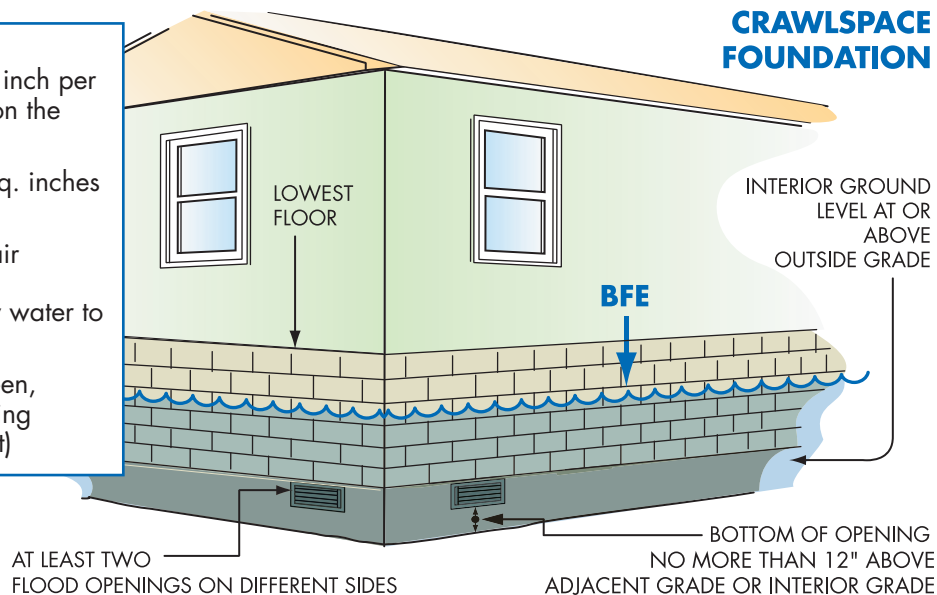
New buildings are not allowed to have basements below the BFE and NFIP flood insurance coverage is very limited in existing basements for a very good reason. It only takes an inch of water over a door threshold or window sill and the entire basement fills up! Excavating a basement into fill doesn't always make it safe because saturated groundwater can damage the walls.

Enclosures Below the Lowest Floor (Zone A/AE)

NOTE:

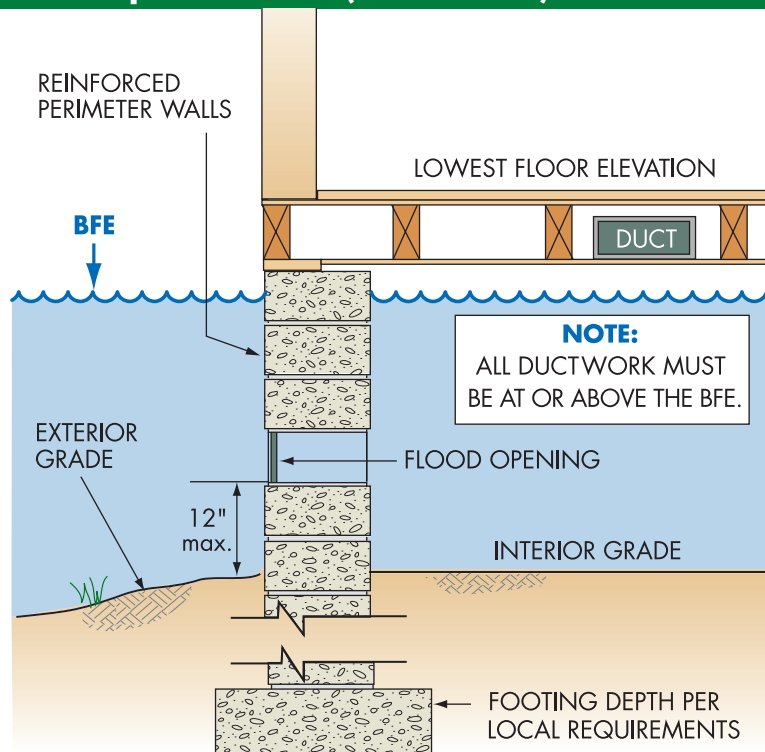
- Total net area of all openings is 1 sq. inch per sq. foot of enclosed area (measured on the outside)
- A 30' x 40' enclosure needs 1,200 sq. inches of openings
- If inserted in flood openings, typical air ventilation units must be permanently disabled in the open position to allow water to flow in and out
- A typical air ventilation unit, with screen, provides 42 to 65 sq. inches of opening (look for "net free area" stamp on unit)

ALTERNATIVE: Engineered openings are acceptable **if certified** to allow adequate automatic inflow and outflow of floodwater.



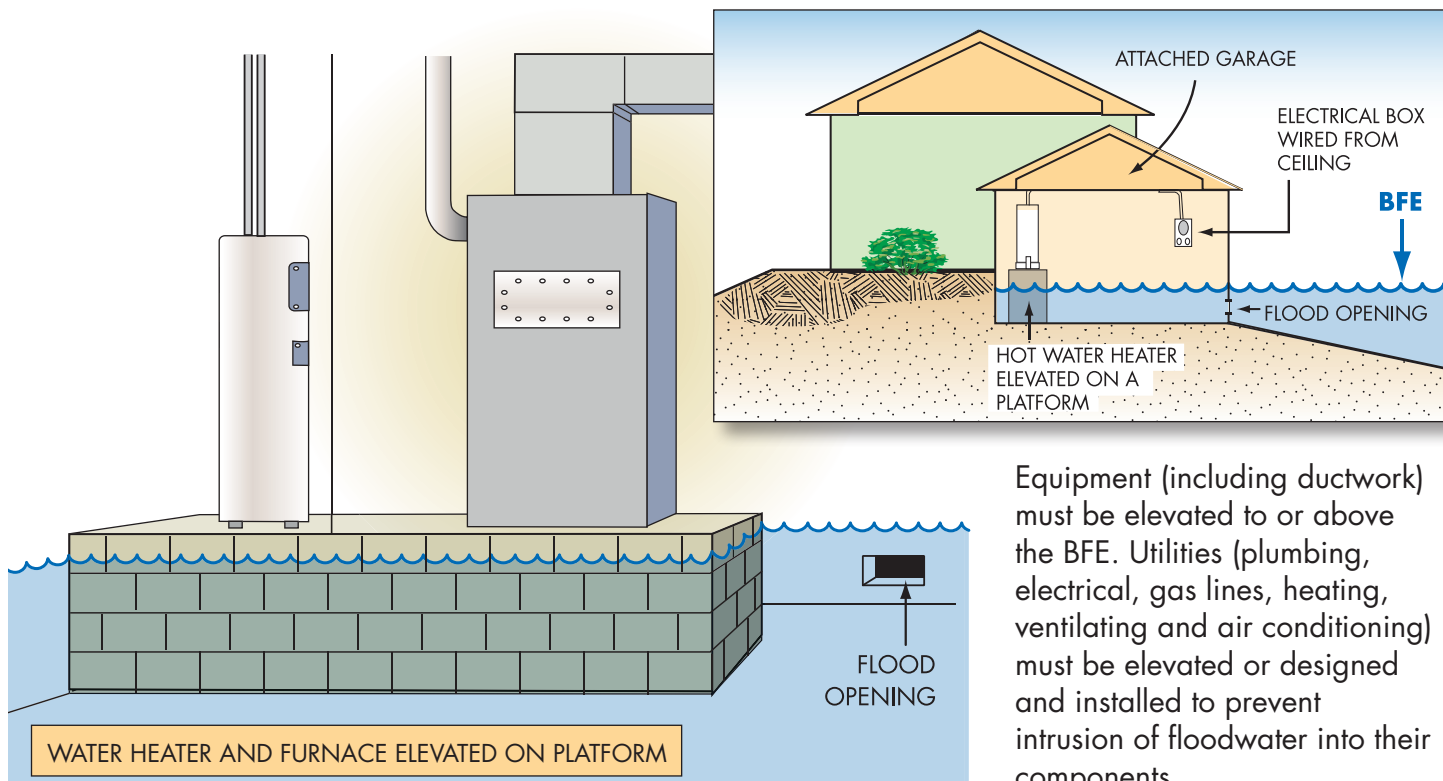
Solid perimeter wall foundations can enclose flood-prone space. A crawlspace is a good way to elevate just a couple of feet. The following are required: Flood openings, elevated utilities, flood damage-resistant materials, and limitations on use. See NFIP Technical Bulletin #1 *Openings in Foundation Walls and Walls of Enclosures* and Technical Bulletin #2 *Flood Damage-Resistant Materials Requirements*.

Crawlspace Details (Zone A/AE)



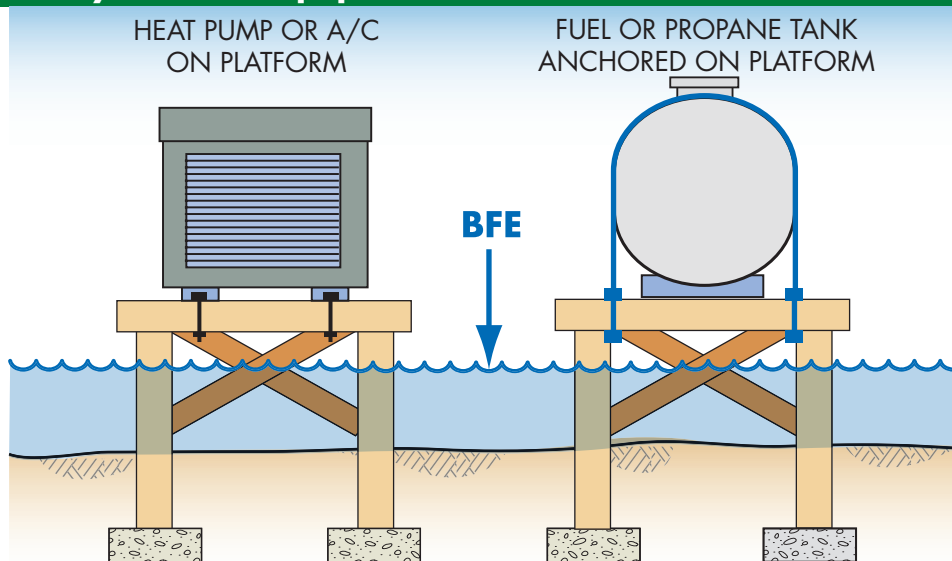
- The Lowest Floor must be at or above the BFE. SEMA recommends another foot or more for greater protection.
- All materials below the lowest floor must be flood resistant.
- Flood openings must provide 1 sq. in. of net open area for every sq. ft. of area enclosed by the perimeter walls – or certified engineered openings may be used.
- A 30' x 40' building needs 1,200 sq. in. of net opening (non-engineered).
- The bottom of flood openings must be no more than 12 inches above the higher of the interior and exterior grades.
- Standard air ventilation units must be permanently disabled in the "open" position to allow water to flow in and out.
- Interior grade must be equal to or higher than exterior grade on at least one side.

Utility Service and Equipment Inside Enclosures



Equipment (including ductwork) must be elevated to or above the BFE. Utilities (plumbing, electrical, gas lines, heating, ventilating and air conditioning) must be elevated or designed and installed to prevent intrusion of floodwater into their components.

Utility Service, Equipment, and Tanks



Important

Information

Fuel and propane tanks may explode or release contents during flooding. Even shallow water can create large buoyant forces on tanks. Tanks may be underground, elevated on platforms or columns, or at-grade and anchored to resist flood loads.

Fuel and propane tanks can pose serious threats to people, property and the environment during flood conditions. Even shallow water can create a large buoyant force on tanks. Search online for FEMA videos on "Fuel Tank Flood Hazards" and "How to Anchor Home Fuel Tanks". "How-To Guides" on anchoring fuel tanks and other flood damage reduction techniques are available at:

<http://www.fema.gov/library/viewRecord.do?id=3262>.

Pools in Flood Hazard Areas

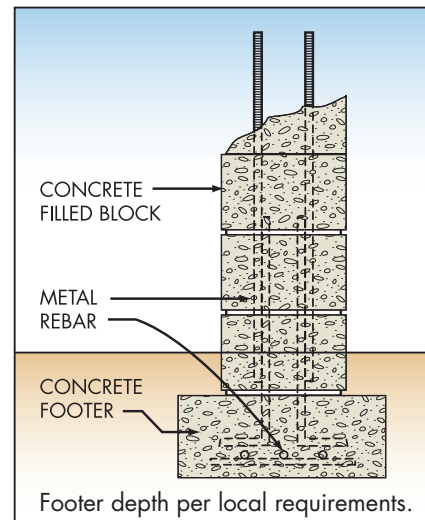
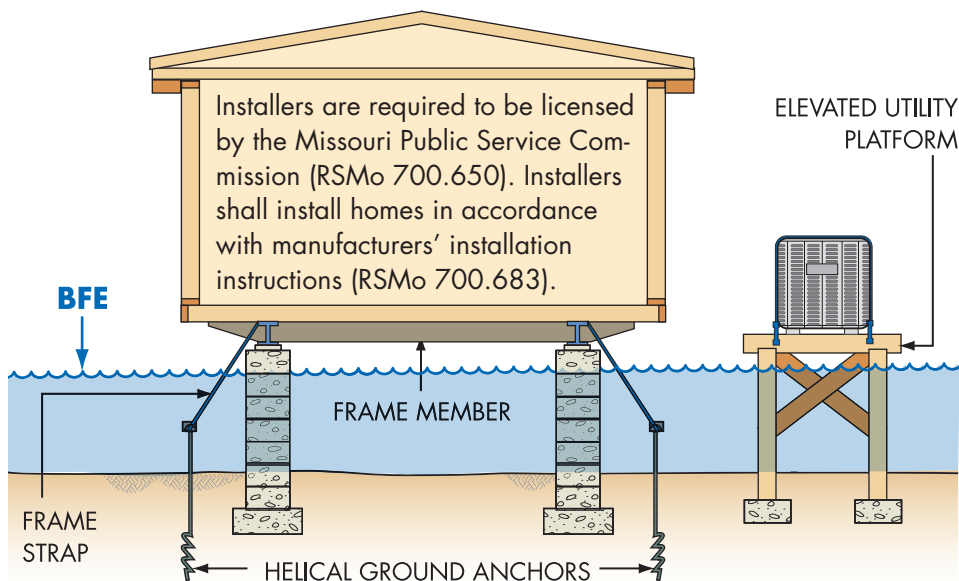
Pools in flood hazard areas should be designed and constructed to be stable during flooding. Empty pools may be dislodged if the surrounding soil becomes saturated. Where a pool is located and whether it is in-ground, above-ground, or a combination (perhaps with associated grading and fill) determine requirements:

- **Floodway fringe** ([see page 12](#)), no additional requirements
- **Floodway** ([see page 12](#)) and riverine flood hazard area with BFEs but no floodway, encroachment analyses for above-ground pools and pools with fill

In addition:

- **Pool houses** must be elevated because they are used for purposes other than parking and storage ([see page 45](#)).
- **Pool controls and equipment** must meet the requirements for utility service ([see page 41](#)).

Manufactured Homes Require Special Attention



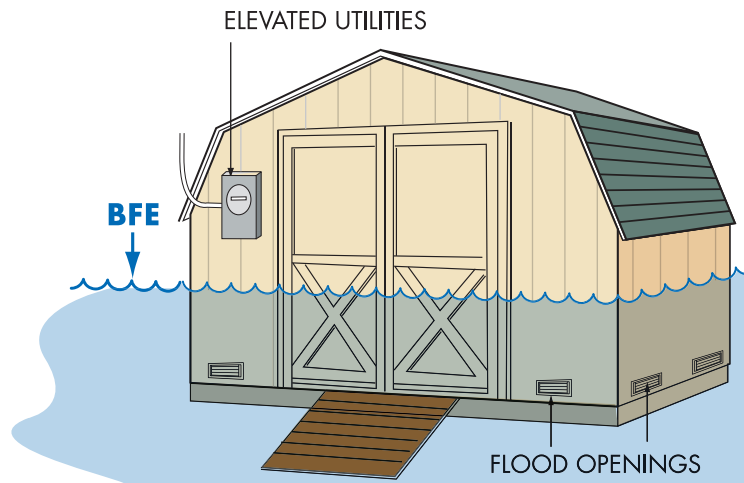
Experience shows that manufactured homes are easily damaged. Just a few inches of water above the floor can cause substantial damage.

Homes must be anchored to reinforced foundations to resist flotation, collapse, and lateral movement and must be tied down in accordance with community ordinances or the manufacturers' installation specifications for SFHAs. See guidance and some pre-engineered designs in FEMA P-85, *Protecting Manufactured Homes from Floods and Other Hazards*.

Accessory Structures

If not elevated, accessory structures in flood zones must:

- Not be habitable
- Be used only for parking or storage (not pollutants or hazardous materials)
- Be anchored to resist floating
- Have flood openings
- Be built of flood damage-resistant materials
- Have elevated utilities
- Not be modified for different use in the future



Even small buildings are “development” and permits or variances with noted conditions are required. They must be elevated or anchored and built to withstand flood damage.

Caution! Remember, everything inside will get wet when flooding occurs.

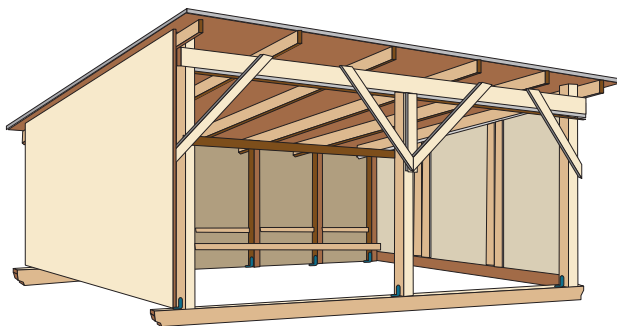
Agricultural Structures

Variances allowed for:

- Pole frame buildings
- Steel grain bins
- Steel frame corn cribs
- General purpose feeding barns open on one side

Variances are not allowed for:

- Livestock confinement buildings
- Poultry houses
- Dairy operations
- Other similar livestock facilities



Important Information

Farm houses are NOT agricultural structures.



State Specific

Guidance

Non-elevated agricultural structures must be considered on a site-specific basis and may be permitted only by variance. Applicants must show that sites are in "wide, expansive floodplain areas" and no other alternative location outside of the floodplain exists.

The best flood protection is to elevate agricultural structures, but certain types can be approved by variance if they are "wet floodproofed."

Recreational Vehicles and Park Trailers

In flood zones, RVs and park trailers must:

- Be licensed and titled as an RV or park trailer (not as a permanent residence)
- Be built on a single chassis
- Must measure 400 sq.ft. or less (measured at largest horizontal projection)
- Have inflated tires and be self-propelled or towable by a light-duty truck
- Have no attached deck, porch, shed, or utilities
- Be used for temporary recreational, camping, travel or seasonal use (no more than 180 consecutive days)
- Have quick-disconnect sewage, water and electrical connectors



Important

Information

Camping near the water?

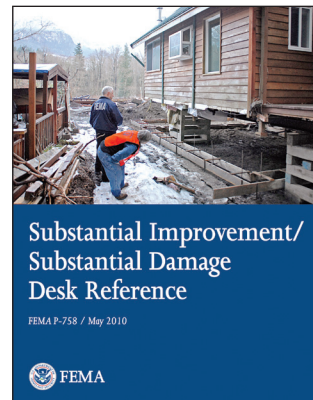
Ask the campground or RV park operator about flood warnings and plans for safe evacuations.

RVs and park trailers that do not meet these conditions must be installed and elevated like manufactured homes, including permanent foundations and tie-downs ([see page 44](#)).

Substantial Improvement/Substantial Damage Desk Reference

FEMA's SI/SD Desk Reference (FEMA P-758) provides guidance and suggested procedures for implementation of the requirements:

- Estimating costs of improvements and costs of repairs
- Estimating market values
- Community and property owner responsibilities
- Administrative requirements
- Key aspects of bringing buildings into compliance
- Suggestions for preparing for disasters



<https://www.fema.gov/media-library/assets/documents/18562>

Terms and Definitions

Substantial Improvement means any reconstruction, rehabilitation, addition, or other improvement of a structure, the cost of which equals or exceeds 50% of the market value of the structure before the start of construction of the improvement. This term includes structures which have incurred substantial damage from any cause (flood, fire, earthquakes, tornadoes, etc.), regardless of the actual repair work performed ([see page 54](#)). Some Missouri communities track improvements over a period of time and trigger compliance when the cumulative improvement value equals or exceeds 50%.

Improvements and Repairs of Buildings in Flood Zones

Permits to improve and repair buildings are required. Local officials must:

- Review costs estimated in construction contracts or other cost estimates (including estimate market value of owner labor and donated labor and materials).
- Estimate the market value using property assessment records or use an independent assessment of market value performed by a licensed appraiser.
- Compare the costs of improvements and costs of repairs to the market value of the building.
- Require buildings to be brought into full compliance if the costs equal or exceed 50% of the market value, called Substantial Improvement (or repair of Substantial Damage).
- Encourage owners to consider other ways to reduce future damage if the comparison is less than 50% ([see page 58](#)).



Important

Information

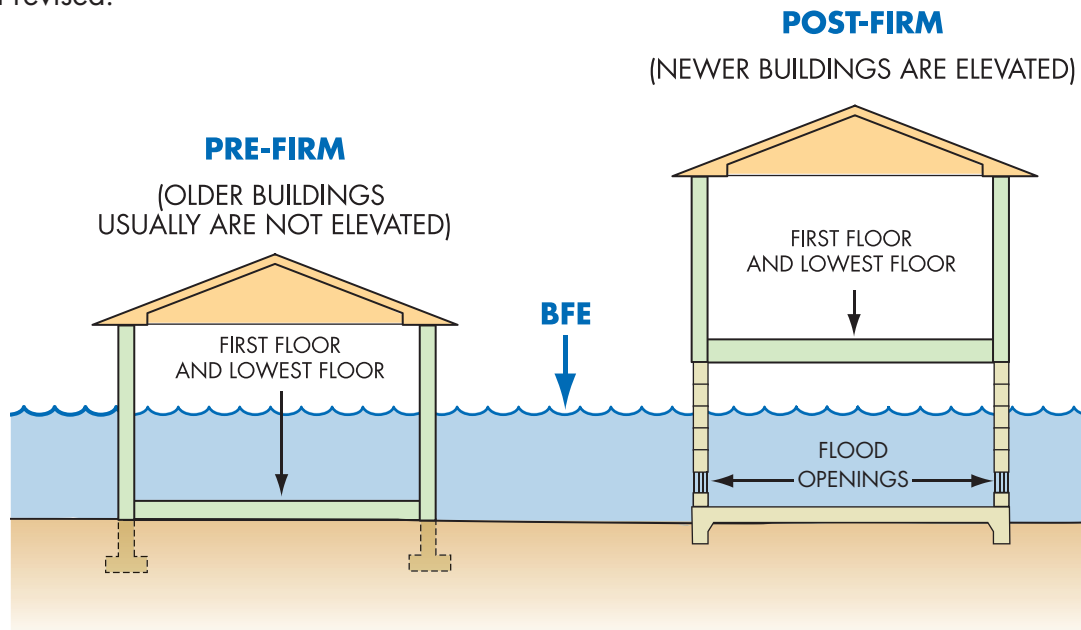
Improvements include:

- Renovation/
rehabilitation of
the interior of the
existing building
([see page 51](#))
- Lateral addition,
without renovation
or structural
alteration of the
existing building
([see page 52](#))
- Lateral addition,
with renovation
or structural
alteration of the
existing building
([see page 53](#))
- Vertical addition
(add new story)

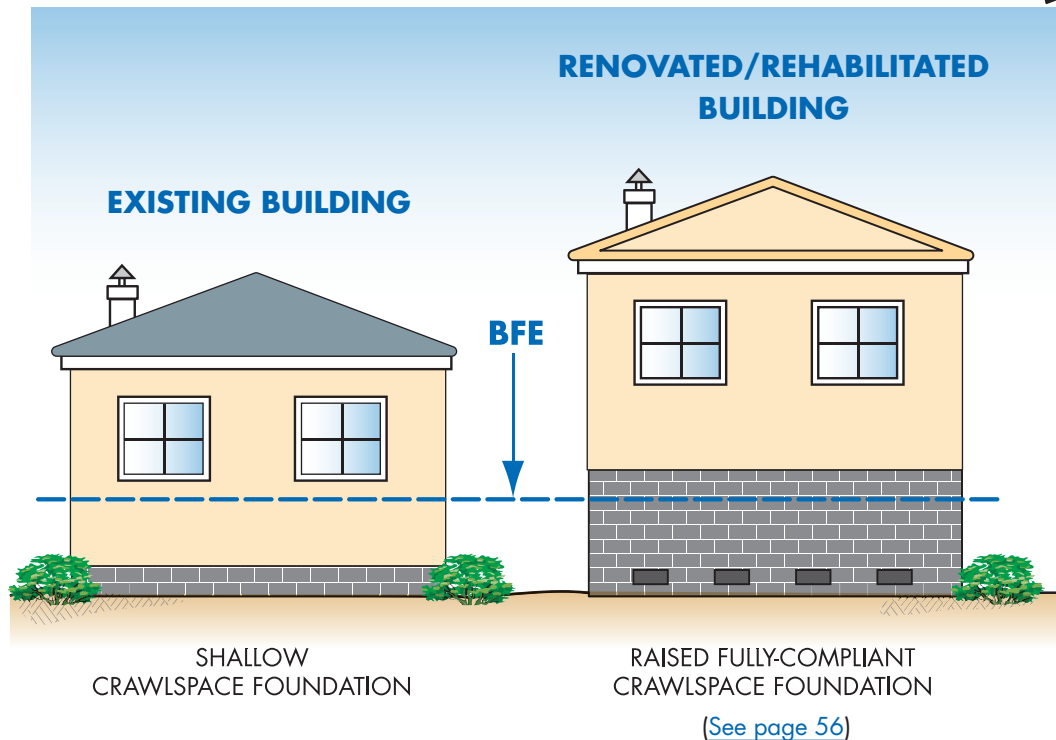
What is Meant by Pre-FIRM and Post-FIRM?

Pre-FIRM and **Post-FIRM** are insurance terms tied to a community's initial FIRM. The terms are used to determine flood insurance rates. Although common, the terms should not be used to distinguish between new construction built before a community joined the NFIP and those built after, especially in communities where the FIRMs have been revised.

Buildings must be brought into compliance when work is determined to be substantial improvement or repair of substantial damage.



Substantial Improvement: Renovation Only



Important

Information

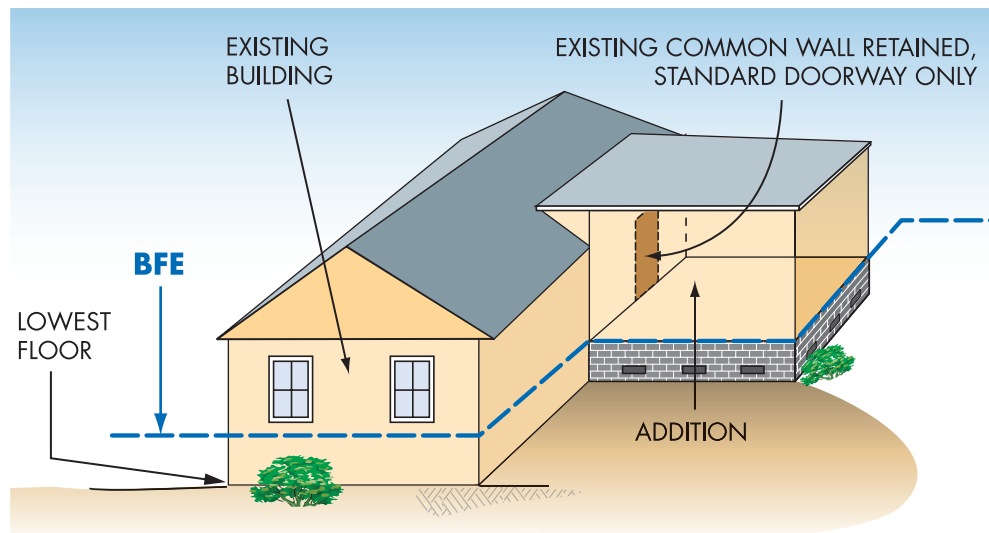
Buildings in SFHAs can be improved, renovated, rehabilitated or altered, but special rules apply.

Consult local permit offices before beginning work. Provide complete information about all proposed work.

If local code officials have cited violations of State or local health, sanitary, or safety codes, minimum costs to correct violations to provide safe living conditions can be excluded from the cost of renovations.

Alteration of registered historic structures are allowed, by variance, as long as the structures continue to meet the criteria for listing as historic structures.

Substantial Improvement: Lateral Addition Only



Important

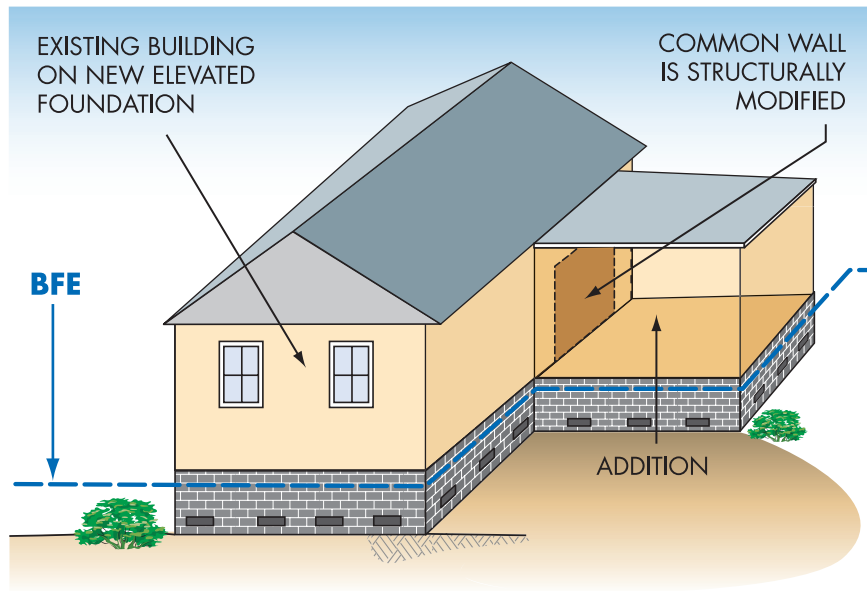
Information

See [page 53](#) for projects to add lateral additions that also modify the interior of the existing building or make structural modifications to the existing common wall.

Permits are required to build additions to buildings in flood zones. Only the addition must be elevated and comply provided:

- There are no other modifications to the existing building, and
- There are no structural modifications to the existing common wall other than adding a standard 36" doorway

Substantial Improvement: Addition Plus Other Work

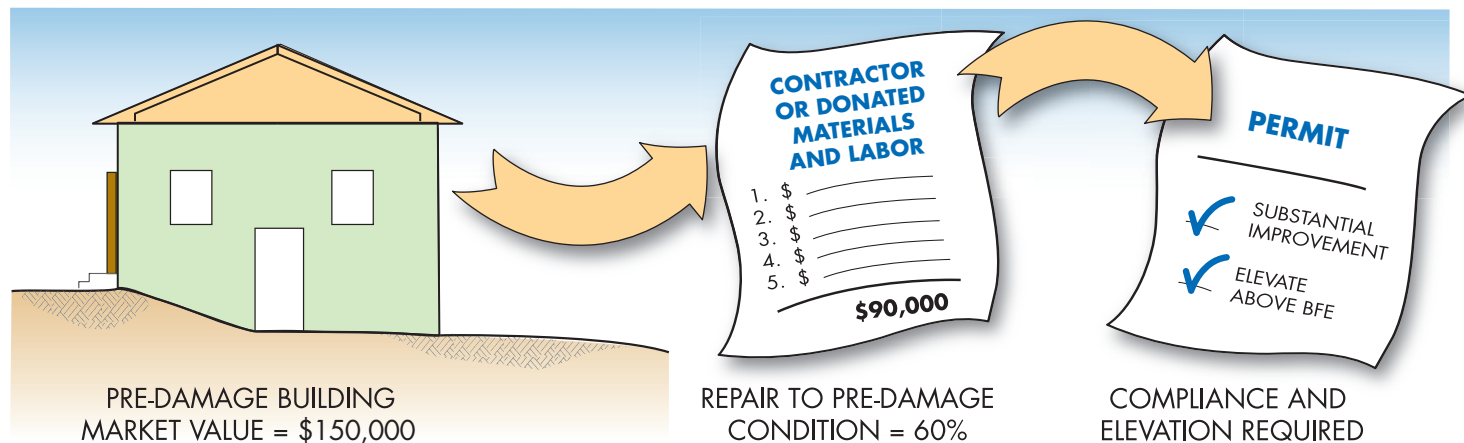


Communities must prepare evaluations to determine if all proposed work will trigger the substantial improvement requirement. Substantial improvement is triggered if:

- The work involves adding new top floors, modifying interiors of existing buildings, or structural modifications to existing common walls (for lateral additions); and
- The cost of all proposed work plus the cost of improvements equals or exceeds 50% of the market value of the existing building.

Community permit offices can help determine which requirements apply when buildings must be brought into compliance. A preliminary review of proposed improvements is recommended before projects are designed and before permit applications are submitted.

Repair of Damaged Buildings

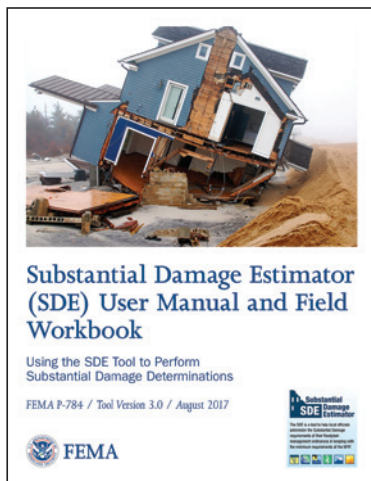


Permits are required to repair damaged buildings, regardless of the cause – fire, flood, wind, or even vehicle impact. Detailed estimates of the cost to repair a building to pre-damage condition are required.

If the costs are 50% or more of the pre-damage market value of the building, then it is “substantially damaged” and must be brought into compliance, which may involve raising the foundation and other measures. Consult with local permit offices before repairs are started.

[See page 56](#) for an example of elevating an existing building above a crawlspace.

Substantial Damage Estimator

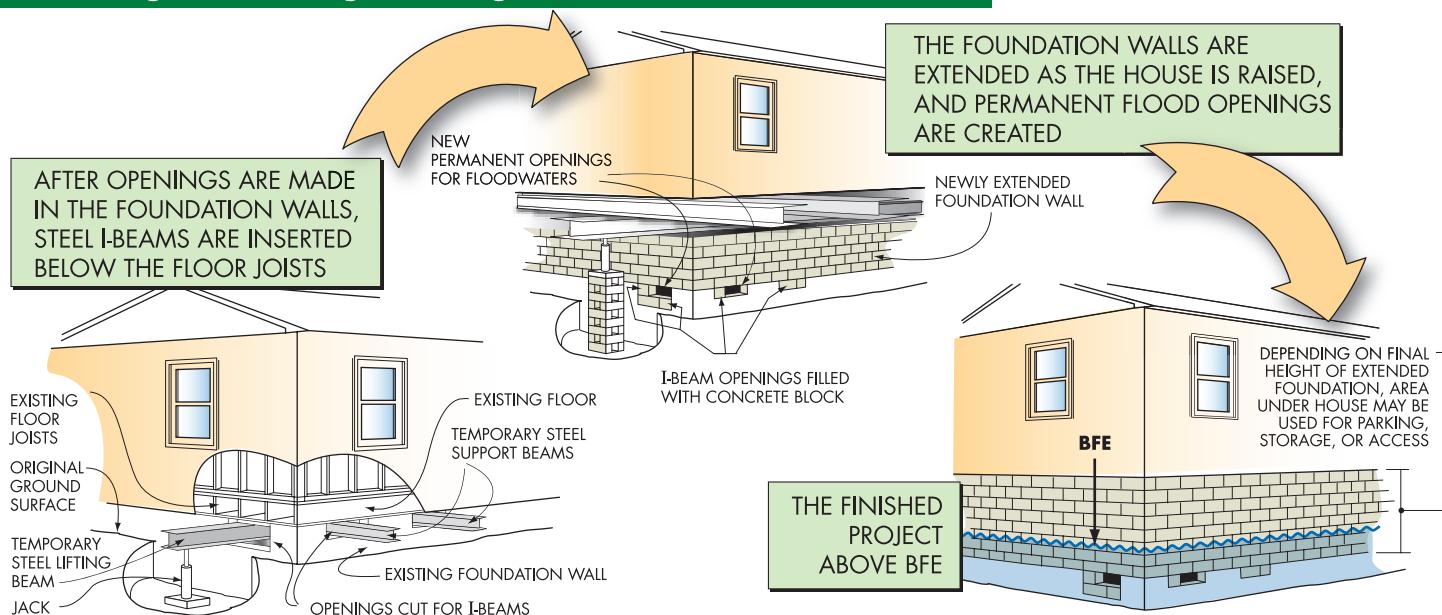


FEMA's SDE tool was developed to help State and local officials in collecting uniform information needed to make substantial damage determinations for residential and non-residential structures in accordance with local floodplain management requirements.

- The tool can be used to assess flood, wind, wildfire, seismic, and other forms of damage.
- The tool helps provide timely substantial damage determinations so that reconstruction can begin following events that damage buildings.
- The tool is used in conjunction with industry-accepted construction cost-estimating guides.

Download the SDE software installation package, User Manual and Workbook, forms, worksheets and other materials at <https://www.fema.gov/media-library/assets/documents/18692>.

Elevating an Existing Building



This is one way to elevate an existing building to comply with building code and floodplain regulations (also see FEMA P-312, *Homeowner's Guide to Retrofitting*). If an NFIP-insured building is damaged by flood and the community determines it is substantially damaged, the owner may be eligible for an **Increased Cost of Compliance** payment ([see page 57](#)).

Paying for Post-Flood Compliance

Owners may be eligible for up to \$30,000 to help pay to bring buildings into compliance with building code and community requirements – if all of the following apply:

- Buildings are located in a mapped flood zone
- Buildings are covered by NFIP flood insurance, which includes Increased Cost of Compliance coverage
- Buildings have lowest floors below the BFE
- The community has made an official determination that buildings were substantially damaged by flooding
- Owners act quickly with their claims adjusters and community officials to process all required paperwork

Learn more at www.fema.gov/increased-cost-compliance-coverage.

Owners whose buildings are substantially damaged are required to “bring the building into compliance” with flood zone requirements. Substantial damage is a special case of substantial improvement.

USE THE ICC CLAIM TO:



ELEVATE-IN-PLACE



RELOCATE TO
HIGH GROUND



DEMOLISH

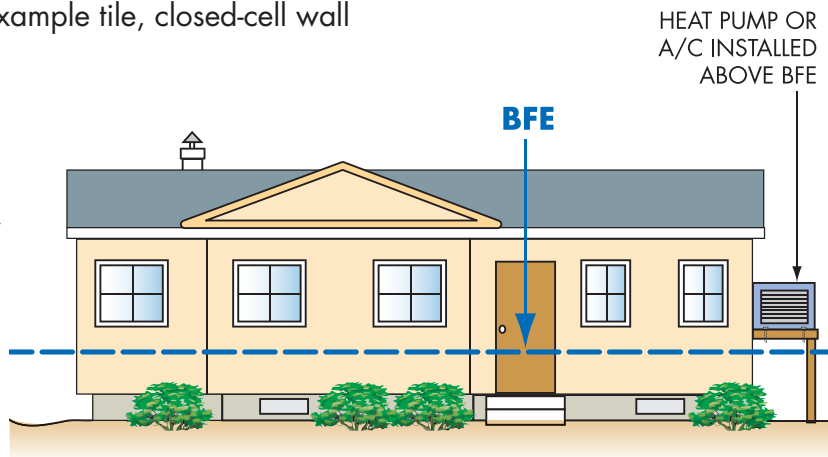


FLOODPROOF
(NON-
RESIDENTIAL
ONLY)

Non-Substantial Improvements

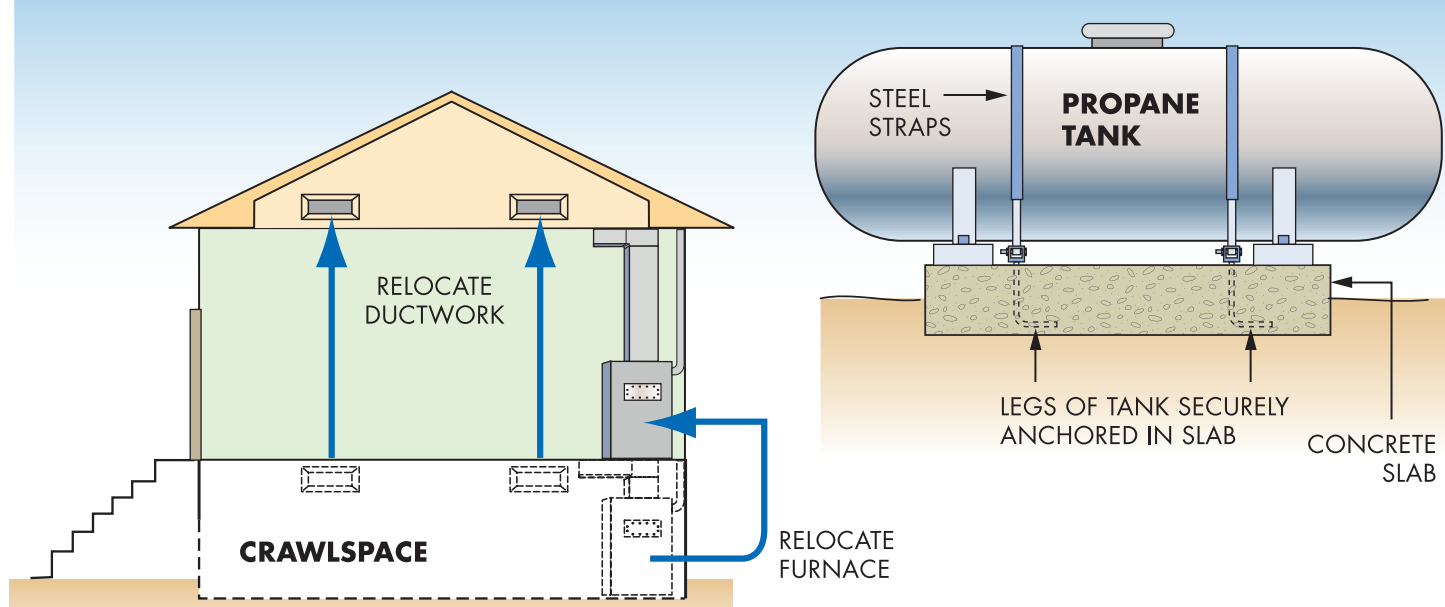
Proposed improvements are “non-substantial” if the costs are less than 50% of the market value of the building. In these cases, buildings are not required to be brought into compliance. However, there are many things owners can do to reduce exposure to future flooding. Owners should consider the following:

- Use flood damage-resistant materials, for example tile, closed-cell wall insulation, and polyvinyl wall coverings
- Raise air conditioning equipment, heat pumps, furnaces, water heaters, and other appliances on platforms
- Move electric outlets higher above the floor
- Add flood openings to crawlspace foundations
- Move ductwork out of crawlspaces
- Fill in below-grade crawlspace



Note! ALL proposed work must be included in permit applications. If more work is proposed or undertaken after a permit is issued, community officials must determine whether the additional work changes the substantial improvement determination.

Some Flood Protection for Older Homes is Easy and Low Cost



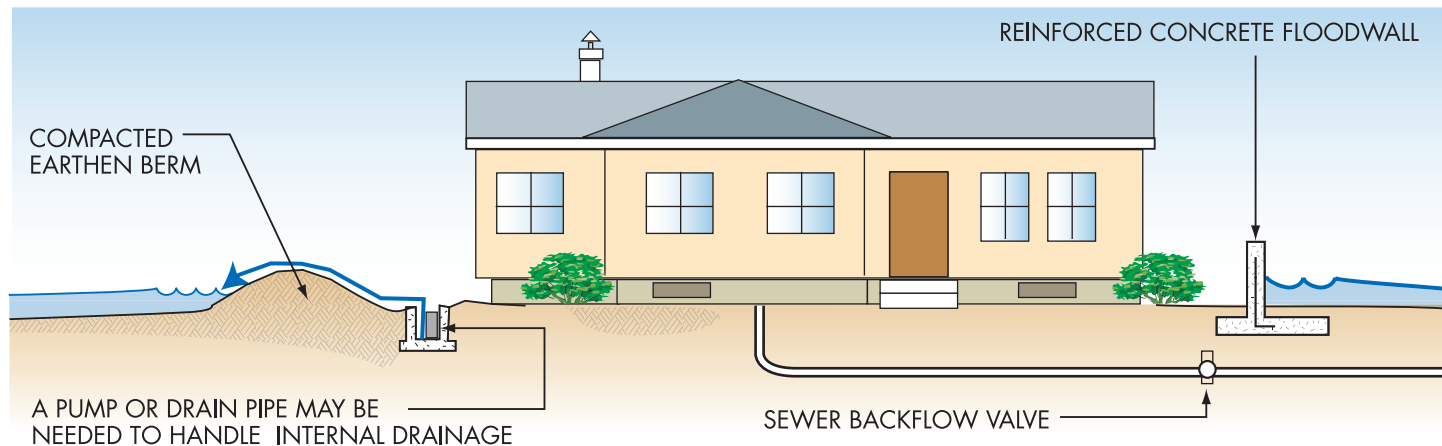
Move fuse boxes, water heaters, furnaces, and ductwork out of crawlspaces and basements.

Anchor heating oil and propane gas tanks to prevent flotation and lateral movement.

Do not store valuables or hazardous materials in a flood-prone crawlspace or basement.

Use water-resistant materials when repairs are made.

Small Berms or Floodwalls May Protect Older Buildings



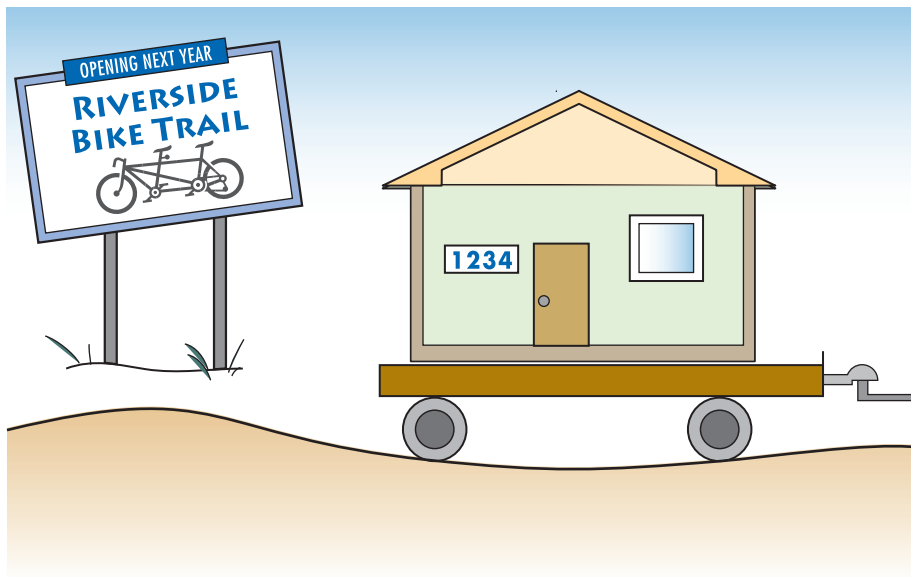
In areas where floodwater isn't expected to be deep, sometimes individual buildings can be protected by earthen berms or concrete floodwalls. Permits are required for these protection measures and extra care must be taken if sites are in floodways ([see page 13](#)). Small berms or floodwalls cannot be used to achieve compliance for new construction, substantially improved buildings, or substantially damaged buildings.

Important! These protective measures will not reduce your NFIP flood insurance premium!

Some Flood Mitigation Projects are More Costly

But Give More Protection

After floods, some communities purchase and demolish homes that were severely damaged. The acquired land is dedicated to stormwater storage or open space and can be used for recreation or to help restore wildlife habitat and wetlands. Some homes have been elevated on new, higher foundations, and others have been moved to safer high ground outside of flood zones.



The State Emergency Management Agency administers FEMA mitigation grant programs. Learn more at https://sema.dps.mo.gov/programs/mitigation_management.php.

Be Prepared for Flood Emergencies

Everyone should be prepared for floods and other emergencies. Preparation begins at home, at work places, at schools, and in communities.

Sometimes floods and other disasters can strike quickly and without warning and evacuation may be required. Basic services (water, gas, electricity and telephones) may be interrupted, perhaps for several days. Local officials and emergency relief works will be on the scene after disasters, but they cannot reach everyone right away. Communities, families, and businesses should prepare before disasters occur by:

- Learning about natural hazards (Missouri communities participate in developing Hazard Mitigation Plans)
- Making family and workplace emergency plans
- Knowing where to go if evacuations are required
- Putting together disaster kits with supplies to last a few days

To learn more about preparing for disasters, visit Plan & Prepare at <http://sema.dps.mo.gov> and contact local emergency management agencies.

1

Create a
Plan

2

Prepare a
Kit

3

Listen for
Information

StormAware: Turn Around Don't Drown®

Learn about flood risks and follow these safety rules:

- When flooding is expected, stay away from creeks, streams, and rivers.
- NEVER drive through flooded roads – they may be washed out.
- Passenger cars may float in only 12-24 inches of water.
- Be especially cautious at night when it is harder to recognize dangers.
- Just 6 inches of fast-moving water can knock you off your feet.
- <http://tadd.weather.gov>.
- Plan and Prepare: <http://sema.dps.mo.gov>.



Useful Resources and Common Acronyms

- Missouri Floodplain Management Section, NFIP State Coordinator, floodplain forms, workshops, training, and resources: www.sema.dps.mo.gov/programs/floodplain/
- Excerpts of the flood provisions of the International Code: www.fema.gov/building-code-resources
- NFIP regulations, Title 44 CFR: www.fema.gov/national-flood-insurance-program/laws-and-regulations
- NFIP Technical Bulletins: www.fema.gov/media-library/resources-documents/collections/4
- CRS Resources: www.fema.gov/national-flood-insurance-program-community-rating-system

Common Acronyms

- BFE = Base Flood Elevation
- EC = Elevation Certificate
- FIRM = Flood Insurance Rate Map
- I-Codes = International Codes
- ICC = Increased Cost of Compliance
- NFIP = National Flood Insurance Program
- SFHA = Special Flood Hazard Area (100-year floodplain)

Want to Learn More?

- For information and advice on permits, contact local building or planning departments.
- For advice on permitting and managing floodplains, and for information about workshops, training and conferences, contact 573-526-9129.
- To learn more about flood maps, go to www.fema.gov/national-flood-insurance-program-flood-hazard-mapping.
- FEMA's on-line publications can be found in the FEMA Library (www.fema.gov/library/) or by using an Internet search engine to search on the publication number or title.
- To learn about NFIP flood insurance, call an insurance agent. Most insurance companies can write NFIP policies.
- To learn the importance of taking steps to financially protect homes and businesses from flood damage go to www.floodsmart.gov.
- Find out about Elevation Certificates and training for professional land surveyors by searching for Elevation Certificate at www.fema.gov.
- To join the Missouri Floodplain Managers Association and see workshop, course, and conference opportunities, go to www.mfsma.org.

Are you
**Storm
Aware?**



stormaware.mo.gov

**SIGN UP FOR
Severe Weather
Alerts**

stormaware.mo.gov

This **Quick Guide** may be downloaded from the
Missouri State Emergency Management Agency web site at:
www.sema.dps.mo.gov/programs/floodplain/

or

Missouri Floodplain and Stormwater Managers Association
www.mfsma.org
(Newsletter/Information)